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ABSTRACT

Originally presented at a symposium on cognition and written language, the 14 papers in this collection discuss research findings regarding reading and writing processes, ways that the development of effective reading and writing can be abetted by instruction, and research needs in the area of cognition and written language. The papers focus on the following topics: methodological issues in writing research, the acquisition of language skills using computer based instruction, analogies between written and spoken language, needed research on processes of invention, issues related to cognition and written language among elementary school students, the cognitive processes in the evaluation of texts, the style of teacher response, the influence of prior knowledge on literary inference, problem solving strategies in writing, strategies used in comprehending written stories, procedures for exploring writers' cognitive maturity, a program to help college students develop operational reasoning skills, the success of informal methods in teaching children to write, and the acquisition and development of individuals' mental lexicons. (GT)

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Cognition and Written Language:

A Symposium

Edited by Alan Purves

Pittsburgh Symposium on
Cognition and Written Language
March 15, 1979

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Summary of Pittsburgh Symposium on Cognition and Written Language

15 March 1979

Fifty years ago, I.A. Richards wrote Practical Criticism, a study of university students reading poetry. That study established a number of points, but one of the clearest was that the reader was not a passive recipient of a text but a person who made meaning. A good reader is open-minded; a poor reader quickly [illegible]ental and subjective. Richards also pointed out the complexity of texts and their individuality as well as the individuality of readers.

Fifty years later, research in cognition, reading, and writing has firmly established Richard's position not only with respect to the reader, but also with respect to the writer. Reading is seen as a process by which the reader "matches" what is in his or her head with the text. Matching may take the form of verifying a word or a phrase; it may take the form of verifying a given complex schema about the world or about a piece of writing with what is presented in the text; at an advanced level, it may take the form of building a new schema as information is gathered from the text. The more advanced reader reads with a more open mind, a mind more able to tolerate ambiguities. Writing is seen as the process by which a person constructs a text by employing a series of purposive strategies so as to affect a reader. Beginning writers tend to be unaware of the reader; more advanced writers tend to have a greater awareness of the context in which they are writing and of their audiences.

From this summary, it would seem that more advanced readers and writers tend to be less ego-centric than other novices. Two major questions remain: is the movement away from ego-centrism in reading or writing developmental in the sense that there are clear stages to that movement? To what extent and in what ways can that movement be abetted by instruction?

In doing research on these two questions, one must consider a number of other issues. Oftentimes research has focused on the expert reader or writer to determine an end-point of the continuum. It is possible, however, that the expert has some special capacity that makes him or her an inappropriate model. A second point is that both reader and writer are conscious of a variety of aspects of a text (i.e. information, meaning, style, affect) so that one must not leap to a conclusion that any one aspect is paramount in a reader's or a writer's mind at a particular instant. A third point is that reading and writing are parts of a complex situation, so that for any particular act as such factors as motivation, task, context, and material must be specified in order to come to any generalization. Fourth, arising from the first three, research needs to look beyond the laboratory, beyond the controlled situation, to the real-life activities of the reader or writer.

A broader question concerning the symposium numbers is that of models. There have been many, from those of the early rhetoricians like Quintilian to those of the literary critic like Northrop Frye, to those of various psychological schools. Some models appear to have been too broad, some appear to have been too rigidly adhered to by teachers. Notwithstanding their failures, models can serve the researcher as a basis for classifying phenomena and as a basis for communications. In reading and writing, a useful task would be to test the validity of various models from those implicit in school practice to those derived from rhetorical, linguistic, and psychological theory. At best, models serve a diagnostic function and can be used by teachers as long as they are not used to turn diagnosis into prejudice. It is at this point that researchers need to be most concerned lest their research actually do the opposite from what has been concluded (as has been the case in the past). Research must inform practice and the information must be well-used.

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Methodological Issues in Writing Research

(1) Currently, as researchers we are beginning to realize that an ever more detailed look at "products" (i.e., the number of t-units in a ninth grader's short story) will not get us any closer to improving writing instruction. What we should be doing then is helping to make respectable research methodologies which examine the ways in which things have been accomplished--the strategies, meaning networks and patterns that make a final outcome possible. What is at issue here revolves around a fundamental dilemma in science: is "objective" observation possible, or is it valid to separate the knower from the known? Further, is an analysis of the parts of a system useful or even relevant if the entire context is not kept in view? Answers to such questions force a new research perspective on us in English Education. It is now possible to take seriously the study of the inexactness of a process even when we know that our results, despite their useful insights, will inevitably fall short of any precise and absolute explanation of the phenomena we are seeking to investigate.

Excellent accounts of this shift toward a more complex consideration of the relationship between the observer and the object of observation have been offered by Michael Polanyi in Personal Knowledge and Marjorie Grene in The Knower and the Known. Their casting of the problem points directly toward a phenomonological view of perception, object, and experience in which knowledge cannot be properly construed apart from the responder who is in fact finally shaping that knowledge. Further support for such a position appears in George Kelly's The Psychology of Personal Constructs and Peter Berger and Thomas Luckmann's The Social Construction of Reality. At the

immediate level of the individual personality, Kelly offers a theory which views people as scientists who are constructing hypothetical maps of the world that will allow them to anticipate future events. It is these personal hypotheses that form the basis of a personal knowledge--knowledge for the individual is the direct result of these expanding chains of predictions even if one's hypotheses only exist at some preverbal level.

Berger and Luckmann offer a similar analysis which touches directly on the problem of the sociology of knowledge. "The sociology of knowledge must first of all concern itself with what people 'know' as 'reality' in their everyday, non- or pre-theoretical lives. In other words, common-sense 'knowledge' rather than 'ideas' must be the central focus for the sociology of knowledge. It is precisely this 'knowledge' that constitutes the fabric of meanings without which no society could exist." (p. 27) The interaction between society and self results in external rituals and roles being legitimized by becoming internal identities. Although frequently our meanings appear to be objective absolutes that reside outside of our personal spheres of influence and creation, in fact our meanings are the end result of long series of human conventions established to mediate between an individual's inner and outer worlds. The inescapable conclusion is that any modern equation of knowledge must recognize whole contexts if it is to begin to do justice to the complexities of the human condition.

The kind of investigation that subjectively focuses on its object of attention has a respectable lineage. Economists, historians, biographers (indeed we must also add poets and novelists) have always added to our ways of knowing by looking at the specific event and allowing its "exact" depiction to reverberate with general significances. This tradition even includes

an awareness of the paradoxes of its own observational/definitional techniques as we see in Yeats' line which by now has almost become a phenomenological cliche: "O body swayed to music, O brightening glance,/ How can we know the dancer from the dance?" And this tradition, as opposed to the tradition of behaviorist psychology, has never feared proposing laws on the basis of individual cases and the claims of mentalist events. Such research strategies in turn have been carried over into the psychological observations of human behavior conducted by Freud and Piaget. In viewing their subjects they were never free from the distortions of their own lenses, but such limitations never deterred them from constructing theories based on a series (however small) of individual instances.

Another, but parallel, view of what counts as knowledge in human experience and how this has affected investigation of the sciences is offered by Paul Diesing in Patterns of Discovery in the Social Sciences. The hero of this story is the holistic methodology, namely the case study or participant-observer forms of research which although originally devised by anthropologists are now being successfully employed by a range of scientific investigators from sociologists and political scientists to historians and clinical psychologists. "The holistic standpoint includes the belief that human systems tend to develop a characteristic wholeness or integrity. They are not simply a loose collection of traits or wants or reflexes or variables of any sort; they have a unity that manifests itself in nearly every part." (p. 137) In believing in the primacy of his subject matter, the holist "believes that whatever else a method may be, it should at least be adequate to the particular thing described and should not distort it." (p. 140) The holist, however, has no real quarrel with making research methods "scientific"

in the traditional sense "only so long as the results do not distort the subject matter beyond self-recognition." (p. 140) Further, Diesing addresses the problem of research tools:

> The only acceptable mechanical devices are those that assist the human observer, like cameras and tape recorders, rather than pretend to substitute for him. And if a model is to be constructed, the only adequate one is the scientist himself, who in the course of his observations turns himself into an analogue of his subject matter. No machine, no computer, can be complex enough to replace the human personality as a model of some other human system. (p. 141) The holist chooses his data-collecting techniques not for their reliability and validity, as the survey researcher does, but for their appropriateness to the subject matter. He tries to select those techniques that will fit the characteristic modes of expression of his subjects and that will bring out the particular facets of their lives that he wishes to study. This is part of what the holist means when he calls for the primacy of subject matter over method. For instance, if the people he is studying are used to expressing themselves in action, the researcher will not impose long verbal interviews on them, but will rely more on participation and observation.... In interviewing, one would not ask about rules and obligations if the informants did not think in those terms, but would instead ask them to tell stories. (pp. 154-55)

Within this framework of holism, Diesing is quite clear about the constructive nature of human knowledge:

> The term discovery is misleading inasmuch as it suggests that scientists are limited to finding something that is already there. The suggestion is that social reality is given for the scientist and his only task is to imitate what is there without changing it. But actually scientific knowledge is in large part an invention or development rather than an imitation; concepts, hypotheses, and theories are not found ready-made in reality but must be constructed. Further, scientific knowledge is part of the process of self-awareness by which societies and individuals "reconstruct" themselves, so that knowledge necessarily changes what is given. The test of truth in the social sciences, as Dewey used to argue, is whether a theory succeeds in changing its social referent, in some fashion that remains to be specified. (p. 14)

In his rich presentation of the cyclical nature of this kind of scientific inquiry Diesing shows how the comparative method is used in case studies to produce workable generalizations: "Comparison is not postponed until the individual case study is completed, but occurs continuously during

study and is an essential part of it." (p. 183) Further, this shuttling back and forth between abstraction and observation is characterized by dialectical thinking. "Holists adopt dialectical thinking to get closer to the particular, the concrete, and they adopt it whenever a line of thought has developed far enough to reveal its abstractness. Dialectic is the logic of the concrete."

In his book World Hypotheses, the philosopher Stephen Pepper lays bare some of the dangers of the holistic mode of approach to science which he labels the "contextualism" hypothesis. This hypothesis has as its "root metaphor" the historical event which is continuously alive from its present vantage point. The activities or "strands" which make up the texture of the event are always related to the defining context of the event. Thus the continual change of patterns is related to the ongoing interplay of opposites: order vs. disorder, wholeness (focus of our attention) vs. details (focus of our analysis), present movement vs. reaching forward and looking backward. The state of flux which Pepper elaborates in detail is summed up in the continuing action represented by the gerund; this is a world hypothesis that focuses on verbs, on processes, "doing, enduring, enjoying." In contrast to "Mechanism" with its root metaphor the machine, "Contextualism" specifically encourages process concerns. It is a synthetic rather than an analytic type of theory. Yet while contextualism provides an adequate philosophical home for the case study, it also suggests its main shortcoming: the super elasticity of the theory ("it contracts to the specious present or it expands to the speculative limits of math/physics"). This potential limitation parallels Diesing's concern over the problem of boundaries: on the one hand the "wholeness" tends to cover more than the researcher can reasonably handle, on the other the "details" seem to be infinitely divisible

which causes a sea of data that continually threatens to drown the researcher or at least blur his field of vision regardless of the aid of the computer (no wonder the two treatment experiment remains so popular).

The holistic approach to knowledge has inspired a number of process studies in the field of English education. In the area of literary response, for instance, Norman Holland among others has vigorously championed research that focuses on the process of response patterns in the reader. In doing this he is building on a strong tradition that has its roots in the nineteenth century with Vernon Lee's The Handling of Words and continues into the twentieth with Louise Rosenblatt's Literature as Exploration. This tradition has continued to see the primary importance of the Reader in the literary equation and Holland's research merely strengthens the claim for a holistic methodology in such investigation. Bolstering up his point of view with help from Diesing, Holland argues for the non-fragmented subject as being central to this study of the reading process. "I see the real difference as between methods that can deal with action within a personal style, that is, methods that look at the reader first and directly, and methods that need to look at the text first and only at the reader indirectly, in relation to the text." (Five Readers Reading, p. 279) In advocating analysis based on the summing across small numbers of single cases Holland has helped to expand the ethnomethodological approach to literary study.

But it is primarily with the other side of the reading act which concerns us here as we consider the appropriateness of the case study approach in our attempt to understand the processes that underlie the act of writing. In this area we already have a fledgling tradition of looking at processes rather than exclusively at products before finally analyzing the two in interaction with each other.

The important work of Janet Emig, Linda Flower, and Sondra Perl in the area of the composing process, for instance, has employed a "talking aloud" strategy in order to externalize what seems to be going on in the writer's head while writing is occurring. At the moment this seems like one of the best approaches in keeping with a holistic philosophy, yet it does raise the dangers that are inherent in the case study approach, especially the establishment of boundaries. When you look at the individual writer writing a composition you are overwhelmed with the number of variables that you must keep juggling, and as you progress in your observations new variables keep occurring to you which previously you might not have been monitoring. Yet as Polanyi notes in The Tacit Dimension, "the very benefits of process research can lead to the danger of over-observation...unbridled lucidity can destroy our understanding of complex matters." (p. 18) Furthermore, the main techniques of writing process research involve all the problems of researcher intervention and contamination. For instance, composing aloud reveals much interesting information, but it also changes the very process which is being examined. Also interruption strategies and debriefing approaches both break the steady flow on the one hand and either lead to inadequate recall or the mythification of previous behaviors on the other. Finally, as we move closer to the "true" moments when composing occurs (in the particular time and space of the writer's own choosing), it becomes increasingly difficult to follow the writer, and thus we must recognize that our lab sessions impose a further constraint on the naturalness of what we are observing. (See Kaminsky, 1979, for a similar critique of The Cloze Procedure in reading research: "While the field of reading is making increasing use of this procedure, it is important to note that we have not altogether duplicated the reading process by forcing the reader to fill in gaps in a written message, and may, in fact, be requiring

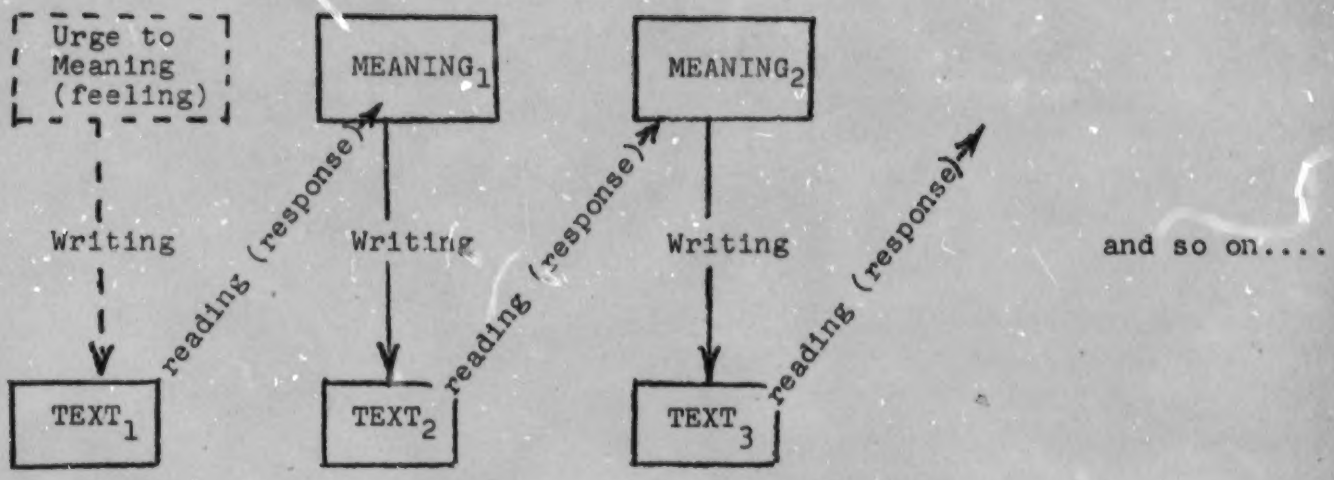
a task which, for some readers, interferes with the reading process." p. 11)

Despite these pitfalls, holist research in the area of composing would benefit from two new devices: (1) a comprehensive notational system and (2) a way of relating noted behaviors systematically to a timeline so that we can begin to get some estimation of the rhythmical and cyclical nature of the interweavings of the composing strands rather than a mere linear lumping together of the components as has been done in the past. In terms of notation we are beginning to look at the process of writing as the transcript of a performance. What we need is a "writing oscilloscope" so that we can see the language act frozen both in time and context, while it simultaneously exists moving from a past through a present into a future. Here again this type of research relates to other ethnomethodological fields from the taxonomies Birdwhistell uses to study kinetics to the "Laban Analysis" systems used for dance notation. The new writing process researcher is thus an anthropologist of sorts who is improvising an ongoing experiment. And such research finally is itself heuristic as the interventions of the researcher begin to shape the meaning dimensions of the act under investigation.

Although severe limitations may exist in the case study approach, I believe it remains our fundamental procedure for generating new and non-trivial questions and theories. Yet only by putting our intellectual efforts behind it will it begin to generate the kind of successes that holistic methods have made possible in other areas of human study, such as psychoanalysis.

(2) Initial process research in composing suggests that what we need to validate is an hypothesis-testing model of the composing process, one which views writing from a <u>construction</u> rather than a <u>transcription</u> framework. Much writing instruction proceeds as though a given meaning already exists

in the student's head. From this perspective the student's task becomes one of finding the right words in order to "transcribe" his/her meaning down on the blank sheet of paper. In opposition to this, we might view writing as growing out of an urge to meaning (a problem waiting to be solved). In this model no real meanings exist until the writer creates a text (this could be an oral text); the writer then discovers his/her meaning (or first approximate meaning) as he/she responds to what he/she has written, and so forth through a given number of necessary drafts. (See figure 1) What needs to be explored is how this retrospective process works in actual practice. Are there any textual clues that help a writer discover these meanings once they have been "created-constructed-invented," rather than "captured," in words? Does a writer in touch with this retrospective process produce better writing in a more efficient manner? What kinds of writing blocks exist for the writer who assumes writing is an act of transcription? Of course, these questions assume a psychological frame (George Kelly) and a holistic methodolgy--to what extent do these prior frameworks in fact determine the nature of the questions we are even capable of asking?



Note: (1) $TEXT_1$ might include lists, notes, diagrams, fragments, etc.
(2) MEANING in each case contains at least two components:
a. "Understanding"--i.e., what the writer constructs for himself as a result of having made the TEXT.
b. "Intention"--i.e., what the writer takes into consideration because s/he want to have some particular rhetorical effect on a particular reader(s). This relates directly to the writer's conscious awareness of the TEXT having a <u>purpose</u> in relation to an <u>audience</u>.

<u>Figure 1</u> (A Construction Model of Writing)

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The Acquisition of Language Skills Using Computer Based Instruction

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Symposium on Cognition and Written Language

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The Acquisition of Language Skills Using Computer Based Instruction

Extensive evidence has been gathered which indicates that English language and reading skills have declined sharply. According to United States Office of Education (1975) statistics, an estimated 23 million adult Americans read at less than an eighth grade level. Most of these individuals cannot be trained to enter the labor force nor can they function effectively in daily life. Newspaper accounts of mothers who give their children ovedoses of medicine because they cannot read bottle labels and indivioauals who unwittingly sign fraudulent contracts stand as strong evidence to support this notion. Also, United States Navy figures indicate that in many urban recruitment centers almost fifty percent of all applicants are disqualified because of illiteracy. Of all those who are accepted, twenty percent are dismissed after basic training. This represents a total manpower loss of over 20,000 men per year.

The problem of poorly developed language skills cannot be traced to inadequate schools alone. Language is acquired through a complex interaction of factors which are tied to the social, economic and cultural roots of the society itself. Studies by Mc Clellan (1956), for example, have found that with almost every factor of language and composition studied, the higher the socioeconomic level of the children, the better their performance in language-related activities. Few of us should find this surprising since linguists have long recognized the influence of a child's environment on the development of language skills. But does that imply that children born with the misfortune of being poor should be sentenced to a life term of poor language skills? Unfortunately many are unless a meaningful language experience is provided for them in the schools they attend. The purpose of this paper is to discuss the salient attributes of a "meaningful language experience" and to describe means to achieve such an experience regardless of a learner's socioeconomic background.

If we acknowledge that learners from higher socioeconomic backgrounds come to school with richer language skills, then we must recognize that certain factors exist within their environments which contribute to this richness. Essentially, these environments are made up of the following conditions for verbal learning (DeCecco, 1968):

1. Meaningfulness. Noble (1952) defines meaningfulness as the number of different associations elicited by a verbal unit. A learner's ability to make associations will strongly influence his/her rapidity of learning. The more frequently a word or phrase appears in a child's environment the greater the familiarity with it and the greater the probability that meaning will be attached to other words. Verbal learning, therefore, is highly dependent upon environments where there are many opportunities for language to be used. The meaningfulness of verbal learning is also related to the amounts of life experience a learner has had. Without it, verbal associations are made incidentally or not at all. Children raised in environments where complex syntactic structure and superfluous vocabulary are a part of every day use will emulate this language sophistication as a natural artifact of their survival within this environment.

2. Instructions to learn. Associations which contribute to the meaningfulness of verbal stimuli can be achieved more quickly if the learner develops a state of readiness which is induced by directions or verbal organizors within the environment. This verbal "set" helps focus the learner's attention on specfic stimuli within an environment which is bombarded with verbal stimuli. Well educated parents whose language has been an important ingredient in their success will take great pains to give their children this necessary state of readiness. Prompting children on appropriate vocabulary and usage is a common part of every middle to upper class home life.

3. Practice. Research on skill learning has well documented the effects of practice: the longer the learner works at learning the more he/she will learn (Underwood, 1964). Research on verbal learning, however, has not resulted in the same degree of certainty about this effect. Essentially, the value of practice, particularly in verbal learning, depends less upon the amounts than on the nature of the practice. More research is needed to discover which types of practice (e.g. massed vs. distributed) are appropriate to various types of learners, what are the effects of over-learning, and whether the whole or part method of presentation is most effective at various levels and with various materials. Among middle to upper socioeconomic groups, children are provided with many opportunities to practice language skills and therefore develop them quickly and effectively. Reinforcement. This is possibly the most important condition of verbal learning. Reinforcement is a confirmation of the learner's correct use of language within various contexts. Language assumes meaning within the context in which it is used. This context has been called the "semantic environment". (Postman, 1976). If communication is to occur, it requires not just a recognition of language but an ordered situation in which language assumes meaning. The semantic environment defines the meaning of words and therefore the nature of communication. Reinforcement is critical in helping learners confirm whether their attempts at using language communicates within the semantic environment. Conversely, it also helps the learner derive meaning from various contexts. Malpropisms serve as fine examples to illustrate this point. Also, expressions such as "swell", "cool", and even "groovy" currently have little meaning in a semantic environment where lunar modules, prevent defenses, transaxles, and defensive air support communicate complex concepts.

The above conditions are not intended to serve as a simplistic explanation of the complex dynamics of language acquisition and use in written and oral form. They merely stand to identify a few of the important characteristics which might be found in the learning environment of the child who possesses well developed language skills. So as not to appear elitist, however, it is important to point out that many children who are economically disadvantages often bring well developed language structures to school. Although their language might differ from standard English, it is rich in imagery, complex in its syntax and varied in its use. These children have had many of the same conditions of verbal development present in their environment as economically advantaged children have except that the semantic environment in which each child communicates is different. In this discussion, we are concerned with learners who have not had the conditions of verbal learning present in their home environments. For this learner new and dynamic methods are needed to provide these conditions in the school environment.

The conditions of verbal learning described above are best developed on an individual basis, preferably in a parent to child relationship. In a school setting this relationship is obviously difficult to achieve. Advances in both teaching and technology, however, have made it possible to present the conditions of verbal learning in an individualized sequence of skills set in a meaningful hierachy. Many applications of instructional technology have been used to implement this process but few of them offer the flexibility and responsiveness that computer based learning does. In short, computer applications to verbal learning provide the learner with a rich, varied learning environment and generally meet most of the conditions of verbal learning mentioned above.

Computer based learning systems which have been designed to develop verbal skills in learners base instruction on a "mastery" approach which emphasizes the successful accomplishment of specified instructional objectives before the learner is permitted to proceed to more difficult skills and concepts. The computer system can diagnose each learner's language competence, prescribe an

appropriate sequence of instruction and then provide interactive instruction which teaches to points of weakness in the subskills and gives adaptive reinforcement which encourages and supports the learner. The computer also offers independent pacing for each student and provides alternative learning paths within lessons or within courses (Caldwell, 1977).

More specifically, computer based learning systems are constructed to fulfill the following conditions which contribute to verbal learning (Caldwell and Rizza, 1978):

The system is totally individualized and offers a highly adaptive and responsive learning environment.

The sophisticated capabilities of the modern computer system allow language instruction to take into account each and every student response. Materials are designed to adapt the amount and extent of instruction to the individual needs of each student. Common techniques such as self-pacing and individualized branching usually employed in programs of individualized instruction are augmented by the ability of the learning system to handle student controlled selection of instructional techniques while providing for a tailoring of teaching to individual performance. In this way, learners are helped to select the pathway through the material which is most appropriate for their needs and are given both regular and distributed practice in language skills. Instruction presented through such a learning system provides the learner with a rich and varied language experience and provides immediate and frequent feedback to responses.

The individual curricula is modularized and structured in coherent, hierachical patterns.

The flexibility of a computer based curriculum lies in its ability to present to the learner a cohesive, comprehensive curriculum organized in a hierarchy of skills from the simple to the more complex. Curriculum materials specifically address each and every necessary language skill in a manner that does not leave skills unattended or require extensive instruction in skills already mastered.

One of the critical design premises is that students are not presented instruction in skills for which they have not demonstrated competency in the prerequisite entry skills. This reduces student frustration and increases curriculum effectiveness. Language instruction presented in small, well-defined units is less intimidating to students than large blocks of material. Success in mastering each small unit helps learners gain confidence and motivates them toward future rewards.

The intended learning outcome of the system are carefully articulated in terms of performance objectives.

Students begin with the simplest objectives and progress to the most complex; this approach minimizes frustration and allows students to measure their own success and progress. The accuracy of the curriculum is based primarily on the specific definition of the objective in terms of performances of specfied skills. In language and reading curriculum, vocabularly can be presented within contexts which are a part of the learner's life experiences. Statements and stories in the curriculum can be derived from situations such as paying bills, reading newspapers, buying at the grocery store and many other common experiences.

The mastery learning paradigm is employed as a basis of advance.

The effectiveness of language instruction is contingent upon the employment of the Mastery Learning Paradigm. This fundamental approach requires that students demonstrate mastery of prerequisite skills before moving on to work on higher order skills. By virtually "guaranteeing" learning, the model minimizes student frustration and enhances learner success because the most efficient use is made of the student's time. Reinforcement is immediate and specific and contributes to shaping language behavior in a carefully designed sequence.

Diognostic and prescriptive strategies are utilized.

The efficiency of the learning system is due primarily to the diagnostic inventory made of the skills of each entering learner. Each incoming student is

assessed to identify language skill deficiencies. This information is used to place each student appropriately within the curriculum and to direct learners to theinstructional material most appropriate to their needs. The system continuously prescirbes the list of available lesson strategies. Studies which have used Computer Based Education as a delivery system to develop Language and reading skills, have produced excellent results. The following serves as a sampling of these results:

1. Computer assisted instruction reduces student anxiety and frustration because of individual attention through branching techniques and immediate reinforcement of the learning process. The result is a reduction in the number of students who drop courses because of failure or lack of interest (Caldwell, 1978).
2. Instructional materials can be covered in less time relative to traditional teaching methods and still achieve an equal or better level of learning. (Caldwell, 1978).
3. Students using CAI not only learned at a more accelerated rate than those taking a more traditional version of courses but also retained material better (Caldwell, 1978).
4. Evaluations of performance data collected from eight demonstration projects in adult basic education centers, correctional institutions, and public schools in Minnesota, Texas and Maryland indicate that adults gained, on the average, one entire school year in reading after less than twelve (12) hours of instruction. Also, dropout rates which usually reach as high as fifty (50) percent in adult programs were for this program less than five (5) percent. (Rizza and Hunter, 1978).
5. An extensive review of literature done as early as 1972 by Fletcher, Suppes and Jamison, revealed practically no negative findings in CAI

evaluations. Nearly all studies revealed a significant superiority of performance under Computed Assisted Instruction.

In short, research studies which evaluate the effectiveness of computer assisted instructional programs yield increases in achievement and positive changes in attitude toward learning as well as consistent reductions in the time students require to achieve determined objectives (Caldwell, 1974). It is possible then that this technology can provide the critical conditions of verbal learning for all children regardless of their socioeconomic status or level of language developments.

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COGNITION AND WRITTEN LANGUAGE

Analogies to Spoken Language

Rita S. Brause

The argument presented in this paper is that studies dealing with written language should use studies in psycholinguistic research into comprehension of spoken language as models. Recent studies have been based on theoretical characterizations of language proposed by Noam Chomsky (1965). Linguistic competence as theorized by Chomsky has been defined as the "adult native speaker-hearer's intuitive knowledge about his language." The typical approach to investigating this hypothesized ability has included the identification of specific aspects of language which have then been placed in creative but isolated formats for the participant to demonstrate understanding. These studies, initiated by Carol Chomsky (1969) and Lila Gleitman and Henry Gleitman (1970) have provided evidence of varying adult abilities, as well as positing developmental sequences in the acquisition of these aspects of language across ages. Implicit in these investigations of generic competencies is the similarity of competence in meaningful contexts.

Language Acquisition

Investigations into language development have suggested that models help in the language learning process, i.e., children of monolingual English speaking parents learn to speak English if residing with those parents in a non-English speaking

country, in addition to learning the language of the native speakers of that country. (See also Cazden (1972) for learning in the family environment.) However, language is not learned by strict imitation. Rather, individuals seem to be endowed with the ability to abstract the critical information in linguistic messages based on their ability to relate events occurring in their environments with the linguistic noises accompanying these events. (This issue is discussed in great detail in Lenneberg, 1967; Slobin, 1971.)

This learning process appears to be innate, systematic, and predictable. However, direct teaching does not seem to be essential, or necessarily effective in the language development process. Analogies regarding this process may be suggested between language acquisition and cognitive development (Moore, 1973; Sinclair-de Zwart, 1973; Dato, 1975; Gallagher, 1978).

Cognitive and Linguistic Development

Piaget (1926/1955) proposed a systematic sequence in the stages of cognitive development evidenced by the individual's ability to perform certain tasks. From his research and that of his colleagues, the predictable aspect of cognitive development has been extensively explored. Analogies have been posited between language development and cognitive development in three major areas:

- similar innate, systematic, predictable processes;
- similar views of the world as evidenced by performance on cognitive and linguistic tasks;

- similar views towards the futility of teaching unless the individual is "ready", i.e., at the appropriate stage of development.

Although these have been hypothesized more often than investigated, there seems to be sufficient support for them to be of importance to linguists and cognitive psychologists.

Written Language - Analogies to Spoken Language

It is proposed here that the hypothesized relationship between language development and cognitive development may serve as the basis for similar investigations into two other correspondences, i.e.,

- the relationship between cognitive development and comprehension of written language (reading), and
- the relationship between cognitive development and the production of written language (writing).

The analogies seem appropriate based on a recognition of the combination of linguistic and cognitive abilities required to produce or to process written language, although the precise processes involved in either writing or reading are certainly unclear at this time. However, it is not intended to suggest that spoken language and written language are the same, although there are similarities, nor that reading and writing are the same processes. However, linguistic research in comprehension and production of spoken language may provide a paradigm for identifying and assessing writing and reading competencies

following the Chomskian distinction between performance and competence and the Piagetian investigatory prototypes. Through careful task analysis, it seems possible to note analogous competencies required in each domain and then to investigate the possible presence of interrelationships across domains (i.e., writing and cognitive development; reading and cognitive development).

Investigations assessing an individual's development in the reading process or the composing process might include some of the following concerns based on Chomskian theory. The desire for tapping competence in assessing development as contrasted with the performance-type studies seems important. These studies would include identifying competence in the composing process through identification of specific components of the process which might include an individual's ability to understand the effects of specific language choices as related to purpose and audience. Thus, an analogy is proposed relating the assessment of linguistic competence to the assessment of reading competence and the assessment of writing competence. Additionally, a distinction is suggested between competence in writing and reading and performance in writing and reading, the latter being more context specific. The concern is for assessing an individual's ability to identify an appropriate linguistic style for a given function (persuasive), and audience (trusted friend). In this process, the individual's ability to analyze or produce a written product is not assessed. It is assumed that for this ability to develop, an individual must be alert to both differences in

styles and to a sense of appropriateness for different audiences. Presumably it is possible to assess these abilities in tapping competence.

Reading Competencies

In relating cognitive development to comprehension of written language, it is critical to establish a clear explanation of the term "comprehension" as the literature is replete with a wide range of views. Comprehension, when viewed in a developmental paradigm, is assessed more in terms of qualitative aspects than quantitative ones, similar to cognitive development in Piagetian terms. Comprehension of literature is one instance of this ability. John Mayher (1977) has described aspects of this process in terms of the relationship between the reader and the text based on theories presented by Chomsky (1965) which explain the notion of competence, and Culler (1975), Richards (1929) and Rosenblatt (1968) which discuss the interactive nature of comprehension. It is possible to relate these interactions to the reader's stage of cognitive development, as noted in studies of comprehension of spoken language.

Writing Competencies

Cognitive theories suggest that for an individual to recognize different audience needs and expectations, a large degree of decentering must have occurred. In addition, the

level of an individual's understanding on a given topic will affect the quantity and quality of response. Thus, in our attempts to understand the writing process and assess writing competence, it seems essential to distinguish between competence and performance. This difference will have important implications for the teaching/learning process.

It seems equally important to investigate the presence of cognitive requisites of the linguistic abilities and the developmental processes affecting the achivement of the mature writer. This concern seems particularly important in the context of understanding the relationship between writing and learning.

Learning, Teaching, and the Acquisition of Written Language Competencies

The possibility of effectively teaching the components of the composing process and the reading process based on theories and findings in cognitive development and language development need to be determined. As educators we need to know the answers to four key questions:

- What is learned when one learns to read and write?
- What commonalities exist between the reading process and the writing process?
- What aspects of these processes may be effectively taught?
- What environments provide the greatest impact on the development of effective writers and rich interpreters of text?

It is suggested that language development theories and research provide important models for answering these issues.

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Conference on English Education
SYMPOSIUM ON COGNITION AND WRITTEN LANGUAGE

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Needed Research on Processes of Invention

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I see a need for research to enlarge our understanding of the process we call "invention" in writing and thus to support our efforts to help students engage productively in the act of invention. I believe that, to judge from most texts and instructional materials that claim to teach invention, we know little about how a writer comes to the point of wanting, and being ready, to record in language some perceptions or arguments about a subject. And I believe that until we have a better understanding of that process, our efforts to teach composing as a total act (as distinguished from teaching outlining or sentence-combing or editing) cannot be successful.

To speak of "invention" as a topic for research is, of course, to oversimplify the problem and virtually to cut off the possibility of significant research. We deal, rather, with a series of sub-problems: small (or large) acts that can be generally labeled as invention but that probably--research might help us to find out--happen in different ways. Of these the first sub-problem, as I see it, is this: what happens to bring a person to the point of perceiving something like "This question or this subject is of sufficient interest to me that I want to think about it some"? A related, but I suspect different, sub-problem is the following: what happens to bring a person to the point of thinking "I want to say thus and such to these readers"? To continue the list of sub-problems: what happens to bring a person to the point of thinking something like "Before I can talk about this subject, I need to find out this or that piece of information"? What brings a person to the point of believing "This is a good idea; I like it," or "This idea won't work; I have to discard it." What brings

a person to the point of saying "This is where I can begin to talk about this subject"? What leads the person to say "This is where I go after I make my beginning"? What leads a person, reading over what he or she has written down, to say "I need to find more information here" or "I need to connect this point here with that point two paragraphs before"? And what leads the same person to discover, as he or she writes and revises, a perception or an argument or a conclusion that was but dimly sensed, if sensed at all, when the writer hit the first keys on the typewriter to begin the writing? What leads a person to discover, as he or she rereads what has been written, and undertakes what has been called "internal revision," that a previously unrecognized question needs answering, a previously unexamined source needs consulting, a previously neglected topic or issue needs discussion? These questions only begin the identification of the range of sub-problems we face, to be sure, but they can at least suggest the kinds of questions we are beginning to try to find ways of answering. Other questions will relate the act of inventing to a writer's identification of audience, and to the ways in which the writer has defined his or her rhetorical problem in writing.

A small but interesting bit of (I think) unintended dialogue in the December, 1978 issue of College Composition and Communication illustrates one of many sides to our problem. In an article entitled "Losing One's Mind: Learning to Write and Edit," Barrett Mandel argued (if I understand him rightly) that there is no connection at all between what writers may verbalize to themselves, mentally, before writing and what they actually put on the page when they write. What they write, Mandel asserted, emerges mysteriously and indescribably; planning of one's writing, though in some ways perhaps a useful stimulus, is in no way the same as actually writing. Donald Murray, on the other hand, in an article entitled "Write Before Writing," drew upon the concept of "rehearsal" and some related

findings developed by Donald Graves to assert, again if I read Murray correctly, that the process of turning ideas over in the mind or saying them half aloud before writing contributes, for some writers at least, to the polishing and perfecting of one's writing--to the precise definition of an idea as it appears finally on paper. The two theorists seem to me to have different views of the connection between cognitive processes and processes of testing language mentally or aloud, on the one hand, and the written language that finally emerges on the other.

Some researchers (Janet Emit, Donald Graves, Linda Flower--to name a few) have usefully begun work on this problem by investigating composing processes of people of different ages and by investigating the problem-solving processes exhibited by various kinds of subjects. Studies of human problem-solving, I suspect, hold great promise as ways of getting at how people come to see ideas that they may want to render in language. Indeed it may be that the "furrowed brow" that Richard Young once identified as the first step in the act of composing can be a symbol for cognitive processes that initiate all of the perceptions referred to in my questions. Extended and coherent work on problem-solving as a cognitive act performed by writers, however, has only recently begun, and it is too early to say how many kinds of questions such research will answer. It is also too early to say how far along toward answering some of our questions (and developing a teaching model) current studies of the composing processes may bring us. My perception, which could be altogether too simplistic, is that these studies have thus far told us more about how writers generally plan, revise, and edit their work than about how these processes bring them to some of the critical activities I have listed. But researchers like Linda Flower, who is studying writer's problem-solving processes, and Sondra Perl, who is looking closely at the composing behaviors of underprepared writers, may take us farther in the direction I have sketched than one can predict right now.

How might the research I have suggested be carried on? Probably, as the researchers mentioned have done, by further case studies and protocol analyses. Despite a fair number of articles on composing processes and problem-solving processes, I sense that the number of cases actually studied thus far has not been large. (Understandably so: case studies are exhaustingly time-consuming.) We may need to find ways of streamlining the process of conducting case studies, so that we can complete more quickly more studies of varied kinds of writers. Conducting such studies in search of some clues about the questions I have listed may require a sharp focus on those parts of a subject's behavior in which he or she is moving toward ideas or perceptions. But, since planning and revising are most probably elements in invention, perhaps our work might be advanced if we ask fairly precise questions of ourselves in the planning of case studies, instead of examining the composing process globally with the intent to learn all at once about many steps in the process. Perhaps the taping and analysis of oral reflections that did not immediately result in writing might help. Perhaps the taping of groups of persons engaged in discussion of questions might help us to uncover the process by which people move toward answers to questions. Perhaps a comparison of the language of a taped discussion or conversation with the written language that purports to embody the results of that conversation could be illuminating. And perhaps focusing on the point at which revision leads to new questions and new ideas will help us to understand the process. What I think we may need are moderate numbers of sharply limited case studies to see whether the behavior on which we focus permits any generalizations.

It is no doubt an oversimplication to urge writers to think, plan, write, rewrite, and edit. At least the first four of these steps, and maybe all five, interact. Having established that they do, we now need to see <u>how</u> they interact, whether we can describe that interaction informatively, and how that interaction helps explain processes of invention.

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ISSUES RELATED TO COGNITION AND WRITTEN LANGUAGE AMONG STUDENTS IN THE ELEMENTARY GRADES[1]

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High/Scope Educational Research Foundation
March 1979

The mainstream of elementary school education has always given highest priority to the teaching of so-called basic skills that are believed to constitute the building blocks of later, more significant learning. In the area of writing, this has generally meant intensive training in penmanship, spelling, punctuation, and the production of conventionally grammatical sentences. Typically little attention is paid to the composition of written discourse or to the problems of communicating through writing.

Increasingly educators are dissatisfied with traditional approaches to the teaching of writing in the elementary grades. Conventional elementary programs have not been successful in preparing most students to cope with writing demands in the later grades. In spite of seemingly incessant drill and practice many students do not become masters of spelling, punctuation, penmanship, and good usage. Still fewer learn to write, if by writing we mean the composition of written discourse that serves communicative purposes both in and outside of school.

Undoubtedly improvements in elementary education can reduce the burden of writing instruction now shouldered by teachers at the secondary level, but how far and by what means remains to be seen. Neither the potentials of young writers nor the conditions necessary for the realization of these potentials are well understood. Anecdotal data, drawn from the experiences of innovative teachers, and rather limited findings from research on writing are suggestive but inconclusive.

At the heart of current speculation about writing instruction in the elementary grades are questions regarding the degree to which and the ways in which cognitive development constrains the learning of writing skills and actual writing performances. Given the demands that the transcription process, not to mention the larger "translation" process (Hayes & Flower, 1978), places upon young writers, can they be expected to manage other aspects of composition? And even if young writers are able to engage more fully in the composing process, are they not too "egocentric" to transform "writer-based" (Flower, 1977) representations of their messages into "reader-based" prose?

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What interpretation can cognitive theory make of observations that young writers often lose track of what they intended to say while struggling to transcribe it? In the course of trying to spell a single unfamiliar word, a grade school writer sometimes forgets the original purpose for writing it. The larger meaning of the discourse, the internal representation of the message, seems to slip away, and the writer must reconstruct it, or create some new semantic representation, before writing can proceed. Does the transcription process exhaust the capacity of working memory, displacing the intended message? Are the processing demands imposed by transcription substantially reduced when young writers do not feel compelled to produce Edited American English prose (or their best approximation thereto) every time they put pencil to paper?

If young writers, in fact, have trouble maintaining an internal representation of what they want to say in working or short-term memory because of competition for limited processing space, does this mean that they are unable to attend to the larger process of composition? The successes that some teachers have working with very young writers suggest not. It seems entirely possible for young writers to maintain the semantic focus of discourse under the right conditions--for example, when they write on topics based in concrete, personal experience. Daily journals and "experience stories" are important genres of writing in many successful writing programs at the elementary level. Many young writers are quite adept at narrative relating first hand experience, in which the structure of discourse is temporal rather than logical. It seems probable that when a writer's message is firmly encoded in long-term episodic memory, there may be no particular need or even advantage to maintaining it in short-term memory while writing, for the entire message structure can be reactivated whenever it is required. Sensory writing (Moffet, 1968), in which one records visual, auditory, tactile, and olfactory experiences as they occur, is another form of discourse accessible to most young writers. Writing in this genre would seem to place the lowest demand on short-term memory since the content and structure of the message evolve as one writes.

When elementary students are not writing from representations of experiences stored in long-term memory or from ongoing experience, it seems far more difficult for them to establish and maintain a consistent thread of discourse. This problem is particularly obvious when young writers attempt exposition and argument, which require logical rather than temporal structure. Although elementary students frequently engage in oral discourse involving exposition and argument, bereft of the semantic moorings of conversation they tend to lose their bearing. Young writers appear to have difficulty formulating holistic plans of the structure and content of such discourse as well as difficulty remembering what was planned. To what extent and in what ways does developmental level constrain the planning process? Might young writers be able to learn executive strategies that would facilitate planning? For example, might knowledge about conventional rhetorical structures appropriate to various types of exposition and argument help them to organize their ideas?

Might oral composition and discussion prior to writing facilitate both planning and remembering? And might not remembering what was planned be aided by external representations of one's ideas in the form of notes, outlines, or other devices?

Even when young writers manage to create and sustain a coherent internal representation of their discourse, they frequently fail to translate it into written language that allows a reader to reconstruct their intended meaning. The impediments to comprehension of a writer's intent are many. Illegible handwriting, unconventional and phonetically implausible spellings, and misleading or omitted punctuation pervade the texts produced by many young writers and may occasionally obscure meaning. However, the attention that these surface features receive from most elementary teachers seems grossly out of proportion to their functional importance. The most serious impediments to successful communication appear to arise from other sources.

Looking through misspellings, unaesthetic handwriting, and atrocious punctuation, one perceives what Flower (1977) has called "writer-based" prose: a linguistic encoding that does not adequately convey the meaning intended by the writer and/or inadequately organizes information for the reader. In this respect, the texts of many young writers closely resemble those produced by adult "basic writers." But while the "writer-based" prose produced by adults is explained in terms of learning deficits, that produced by young writers is often considered the inevitable result of cognitive immaturity, particularly "egocentrism." The implication of this position is that nothing can be done but wait until young writers grow older. Yet, some young writers rather consistently product prose that is effectively "reader-based," and many more do so on occasion. What accounts for such inter- and intra-individual variation?

My colleagues and I are particularly interested in the role that rewriting might play in the efforts of young writers to produce effective "reader-based" prose. Even professional writers generally find it impossible to coordinate all aspects of the composing process simultaneously given the limitations upon human information processing power. They treat first drafts as points of departure for rewriting(s) rather than as final products. Yet, elementary students are typically led to believe that writing is a one-shot process. If they revise at all, it is to correct mistakes in spelling or other surface features. If young writers were encouraged and motivated to rewrite--i.e., recompose--their texts, would it make a difference? How effectively can young writers evaluate what they have written from the perspective of a reader with particular characteristics? Can they identify unreasonable presupposition in their own discourse? Can they utilize feedback from readers in recomposing their texts? By breaking the composing process into subroutines could elementary students generate more effective discourse? And would such processing strategies contribute to their long-term development as writers or merely circumvent short-run developmental constraints?

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Toward a Theory of the Cognitive Processes in the Evaluation of Texts

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We find ourselves at a pivotal point in language studies: an interdisciplinary search for understanding of writing processes has begun in the last three years much like the interdisciplinary search for understanding of the reading comprehension processes began fifteen years ago. Work is being done towards a theory of composing in written prose (Bruce, Collins, Rubin and Gentner, 1978), and coherent theories have even been proposed (de Beaugrande, forthcoming; Flower and Hayes, in press; Nold, 1978a). With increased government funding, the work on writing processes is likely to proceed faster than that for reading comprehension processes, mainly because of our background in research on reading.

The work in both the production and comprehension processes ought to continue, as its potential benefit to society is easily apprehended. Yet there is one more process that ought to be studied, for an understanding of it has equal potential benefit to society: the process of evaluation of written language. Understanding the evaluation process is important, first, because most writing instruction in both the schools and in industry is based on evaluation of the written product to diagnose dysfunctions in the processes and gaps in the knowledge that the writer employed to produce the writing. Knowing how instructors make their evaluations and apply them to their diagnoses is important both for insights into and possible ameliorations of the processes of teaching composition. Second, with the rise in competency testing and accountability, there is increasing motivation to

make the testing of writing ability both reliable and valid. Since, as Hirsch (in press) argues, the most valid test of writing ability requires assessment of actual written productions by those who (imaginatively, if necessary) assume the role of the intended readers of the production, we must understand how readers come to their evaluations and then if their processes can be altered to assure reliable results that are generalizable over the many different purposes, genres and audiences of writing. Third, understanding might eventually help teachers entice students to read, or at least illuminate the reasons why they cannot.

A theory of evaluation of texts must have as its basis a theory of comprehension that accounts both for (1) local strategies in processing phrases and clauses in short-term memory for inclusion into a growing Text Meaning Representation in long-term memory and (2) global expectations about the purpose, intended meaning, form (schema), audience, and writer of texts--expectations that readers store in long-term memory and activate heuristically to create coherence among the larger elements of the text being processed. This unified theory of comprehension is necessary because factor analytic studies of the evaluation of writing (see, for instance, Diederich, French and Carleton, 1961) indicate that judgment is based to some extent on fulfillment of both global expectations and local expectations in processing (and, of course, because lack of fulfillment of global expectations most probably leads to processing difficulties on the local level, too).

The necessary unified theory of comprehension lies behind and explains the subprocesses of CONTEXTUALIZE and PROCESS TEXT, the

first two subprocesses in the tentative model of the evaluation process outlined in Figure 1. The recursive arrow on the right of the diagram between the boxes indicating these two subprocesses shows that reading is conceived neither as just a top-down process (the schema in long-term memory providing patterns into which the elements of the text are placed and understood) or as just a bottom-up process (in which elements of the text are linearly integrated into a growing Text Meaning Representation in long-term memory in response to cohesion-making cues in the text, principally sentence grammar and the cohesion devices catalogued by Halliday and Hasan (1977)). For an experienced reader, comprehending a particular text certainly begins before one word of the text is read: he forms a set of expectations about the kind of text, the quality of text, the intentions of the writer, the persona of the writer, the intended audience of the writing, the allowable range of topics the writing can cover, and the potential comprehensibility of the text, among other expectations. Thus, for an experienced reader, reading is initially a top-down process, as the placement of the CONTEXTUALIZE subprocess indicates. However, as soon as an experienced reader begins to read a text, he fills in expectations that he lacks and revises expectations that he has in response to cues from the text. These expectations are also entered into long-term memory as products of the bottom-up linear PROCESS TEXT subprocess. In response to cues from the text or other cognitive events, he may return to the CONTEXTUALIZE process, drawing from long-term memory schema that were not available prior to the processing of the text. For an experienced reader, then, comprehension

is a result of a complex process of the integration of new information into long-term memory and the fulfillment of expectations engendered from knowledge outside the text and from cues in the text.

The subprocess of EVALUATE TEXT is a matter of determining matches between

(1) expectations drawn from the evaluator's long-term memory (knowledge, form of text, approximate ability of writer) and their fulfillment in the text,

(2) expectations engendered by the text and their fulfillment in the text,

(3) the realized fulfillment of all the constraints acting on the text (purpose, intended meaning, audience, writer's persona, conventions of written language) and the optimal fulfillment of those constraints.

These fits are indicated in Figure 1 by broken lines that connect various elements in long-term memory. The recursive arrow between EVALUATE TEXT and PROCESS TEXT shows that evaluation is not conceived as a one-time occurrence after the text is processed; rather, it can alternate with processing of the text, and its results are stored and updated in the long-term memory. Since the evaluation is stored in memory in a mainly inchoate non-linguistic form, its "output" can be shaped by circumstances. For instance, in natural circumstances, a reader might, upon encountering significant mismatches in any of the three categories listed above, simply stop reading. Or, constrained by his task to read all the way through the piece, but unconstrained in the form of his response, the

reader might simply say "This text was awful--simply not worth reading." Further constrained in the form of his response by rating scales, he might give the text a holistic score of 1 on a 4 to 1 scale. Analytic scales might even further constrain him to single out the areas in which the text succeeded and failed. We are only beginning to study experimentally what weights readers give these three kinds of matches (and elements within each category) in a final evaluation of a text (Freedman, 1977).

Though this tentative model is developed and explored in much more depth elsewhere (Nold, 1978), two related subjects must be touched upon before this short paper ends: the important concept of the valid violation of expectations and the model's implication about the optimal evaluator. Categories (1) and (2) differ from (3) in that mismatches between expectations and realization are not always suboptimal for every reader and genre. In fact, one could imagine that a reader might sense that his expectations were validly violated (i.e., that he learned a new way of conceiving of a problem, that he found a new and interesting genre of writing, that he just read a wonderfully ironic piece of writing, or--as in a detective novel-- that he was thoroughly fooled by following one set of evidence rather than another equally plausible set, revealed to him at the end of the text). This reader may indeed rate the quality of the text higher than a similar one that met most or all of his expectations. The writer, then, runs a risk when he violates expectations--that he will not be understood. He trades this risk off against the hope that, if his intentions are indeed divined and appreciated, his text will be judged as more useful and pleasurable than the more conventional ones even though it is harder to comprehend.

This model suggests that the optimal evaluator for a text is one who has (1) experiences with similar texts, writers, audiences, topics (i.e., well-developed schemas) (2) excellent ability to discover the intrinsic structure of texts (i.e., well-developed reading strategies) and (3) a well-developed sense of other options open to a particular writer, given the constraints of his task (i.e., well-developed text-production strategies). In addition, the evaluator must, paradoxically, be flexible enough to allow some texts to validly violate his expectations. To the extent that we fail to supply optimal evaluators of the writing of students, we fail in one of the first main steps of the pedagogy of writing and of the testing of writing. In order to gain insight into our successes and failures, we should continue to develop and test models of the processes of evaluation of texts.

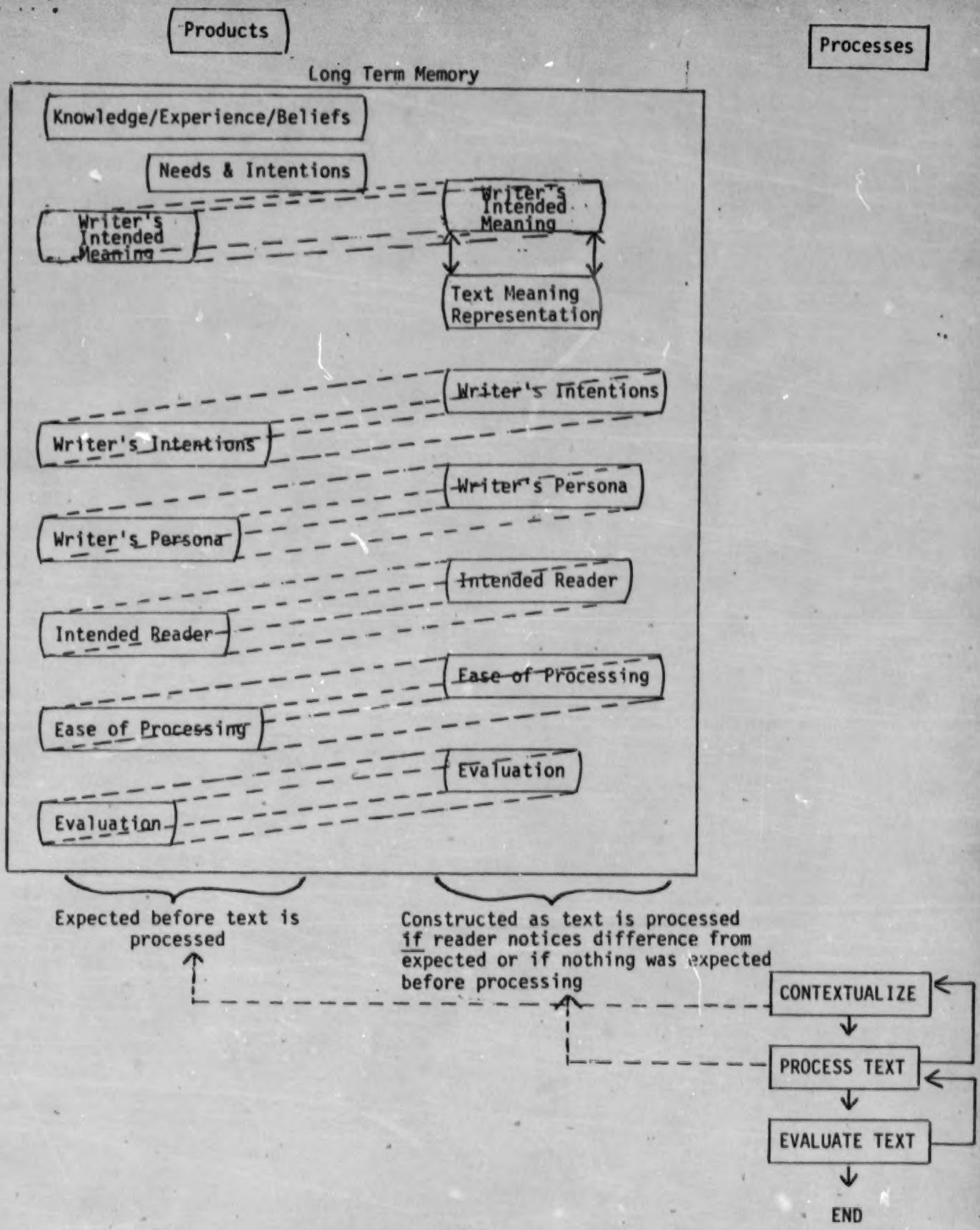

Figure 1

An Experienced Reader's Evaluation Process

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"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
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The Style of Teacher Response

Teacher response is not exactly a new subject of research. But some studies in this area have been inconclusive (and admitted as such by their authors) and, more important, some teachers of writing behave as if they believed the results are inconclusive. If research has shown that extensive comments and corrections do not improve writing, then why do many of us still spend half of our time as teachers commenting on student papers? We assume that comments have pedagogical value even though we are not sure what that value is. Thus we must treat teacher response as if it were a new subject in order to test the assumptions we have been working under.

I want to examine a few broad questions and the assumptions implicit in our answers to these questions. What are the reasons for the enormous amounts of time spent on teacher response? How do we spend our time? After re-evaluating some of the assumptions we make, we can prepare ourselves to ask other questions. How should we spend our time? Is there a way to make comments more effective? How can we build comments into our teaching process and thus into our students' learning process?

1. It seems obvious that the main reason we respond to papers is to give positive and negative feedback about the writing. Since we cannot meet with every student after every paper (the ideal?), we depend on written response as our prime means of communication with

our students. The assumption is, of course, that we <u>are</u> communicating, that students understand the language of comments. My own illusion of communication was shattered once when a freshman asked, at the end of the term, "What does this backwards P mean?" Perhaps he missed class the day I mentioned that I would use some proofreader's symbols and (for some reason) never asked about my shorthand comments during conferences. What happened in his mind, then, whenever he saw "Begin new¶ here"? More generally, when we write "Rephrase" in the margin, does the student know how to rephrase, and why?

The first problem here is that comments are sometimes written for the teacher herself (as notes used to determine the grade for a paper?) and not for the student. Or perhaps we use language understandable to our colleagues but not to our students. The second problem is that students don't know how to interpret, to translate our comments. Do they actually read and understand what we write or do they substitute their preconceived, vague notions of what their writing flaws are? After reading a meticulous and complex set of comments, how can a student say, "Oh, I see. My writing doesn't flow smoothly"?

One exercise I use to force students to interpret my comments is to ask them (about 2 months into the term) to re-read all of my previous responses and to look for patterns. Then they are asked to write a few paragraphs evaluating themselves as writers. This simple practise suggests a way of testing how students read and interpret response: have subjects paraphrase a paper's comments and compare this paraphrase with what the respondent originally wrote.

2. Besides assuming that we are understood, many of us assume that the more we write on a paper the better job we are doing (the more we care? the more students will think we care about their writing?). Yet there may be some upper bound in the sheer quantity of comments beyond which the student will not be able to assimilate our response. How many times have we written an entire page of comments only to have the student ask "Yes, but why did I get a D?" or "Yes, but what was <u>really</u> wrong with the paper?"? We must determine, through research, if students are able to summarize lenghthy response, if they are able to cull out the main critiques.

2a. As a corollary to our maximum quantity theory, many of us believe in maximum thoroughness principles--or act as if we do. No dangling participle is left dangling when we are finished with a paper. Yet this attention to every detail may confuse students about the main flaws and beauties of their writing. And summing up the basic problems of a paper at the end may not always demystify the student faced with marks, circles, and arrows. Thus even though we often view the process of writing and the evaluation of writing as holistic, is there more pedagogic value, and cognitive value, in responding to a paper according to only a few criteria, based on the particular assignment?

Some work has already been done in this area, but it seems to be disregarded in practise. An obvious way of testing the relative effectiveness of limited and thorough response would be to set up an experiment in which two sets of papers on the same assignment were responded to in two extreme ways. In two groups of equivalent student writers, X and Y, group X gets comments relating only to that specific

writing task and group Y gets comments on every aspect of the writing. Now one could give a similar assignment requiring comparable skills and determine which group shows more improvement. Next, one could give a very different writing task and then determine whether, over-all, the group Y writing is better. Thus we would try to measure the learning transfer of different types of response.

3a. One justification for extensive teacher response is that it makes students re-evaluate their own papers. But do we know exactly what languages, what styles, to use to urge students to respond to our response? Many of us "know" intuitively that comments as questions are more effective than declarative statements are, and studies support this (e.g., Britton et al., 1975). Yet the style of much teacher response is still dominated by terse comments and declarative directives. We need more research to learn how students react to different styles of response, and to discover which sorts of questions are read as polite suggestions and which are interpreted as real queries demanding some answer from the student.

3b. For writing courses in which students have the option of revising any paper any number of times, we assume that our written response invites such revision. But do we know what style of comments to use to provoke numerous and effective rewritings? How do we use our written response to stress that writing is a process and not an end product? Do any of our typical comments sound like dead ends to our students? I don't see any way to test this except in a real classroom situation. In two comparable sections of the same course, where both instructors encourage as many revisions as students want to write, have the two instructors employ measurably different response

styles (for example, one style full of suggestions of various rephrasings and restructurings for various effects), and then count the number of revisions during one term for each section.

4. We assume that students read, understand, and benefit from our response, that they use it to try to do better on the next assignment. And yet we see our students peek first at the last page for the grade and then merely skim the comments. Not giving grades may not be the best solution and creates other problems. As a first step, artificial exercises may be in order.

One of my colleagues has his students copy all of their comments from papers into their notebooks. This, at least, insures that the comments get read. For a technical writing assignment, I have students get comments from an expert in their field as well as from me, for one of their papers. I supply them with specific directions on how to revise their papers using these two sets of feedback and their own critical judgment. Their revisions are then evaluated according to how well they have responded to both sets of response, on how they have solved the writing and the technical problems indicated to them.

How can we get students to internalize teacher response so that it becomes part of their learning process? After teacher response is interpreted, how is it stored? How is stored information, gleaned from teacher response, merged with the student's own critique of his writing? with skills he learns in class? How is this merged knowledge used to approach the next assignment? When refining our models of the cognitive process of writing we must somewhere include,

not just the writer's stored past knowledge about writing (this might be too general), but his immediate knowledge gained from teacher response to his most recent papers.

This is a huge and perhaps impossible task, but since we operate as if teacher response is a large part of the learning process, we must research it further. In fact, we have still not adequately studied the effects of many small differences in the style of teacher response. By "style" here I include such things as whether one uses a red pencil or a peacock blue pen, and whether one uses symbols to mark grammar errors or writes in full sentences. But more important are the language of the teacher and the assumptions he makes about how students respond to his language. Many of these assumptions need to be tested before they are accepted as laws.

The Influence of Prior Knowledge on Literary Inference

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

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I have often wondered why televised sports are so appealing to so many millions of people. One reason may be that viewers like to watch something they know a lot about--a change of pace from having to deal with experiences and people they don't know much about. In watching all those hours of TV sports, they really get to know the rules of the game. Because they are constantly being instructed by the commentators about various strategies they learn to identify players' use of these strategies. And since these strategies are constituted by a well-defined set of conventions, viewers become quite confident about their ability to make inferences. They know when the quarterback has done the right thing or has blown it. They know that if you freeze the ball in a basketball game the other team may become impatient and may try to steal the ball, thus committing fouls. Being an expert inference-maker of such contingencies, implications and ramifications can only further bolster one's confidence.

Readers' confidence in their ability to respond to literary texts may also have much to do with their knowledge of social and literary conventions. If this is the case, the question I wish to pursue is: how does prior knowledge of these conventions influence readers' understanding of literary texts, their ability to make inferences about a text? Will readers with extensive knowledge of the particular convertions in a genre understand works in that genre to a greater degree than readers with less extensive knowledge of that genre? It seems probable that the degree to which readers understand a text is relative to the prior knowledge they bring to that text. This is all fairly obvious. However, we still know little about the processes readers employ in applying their prior knowledge to texts.

Theory and research on the influence of prior knowledge on literary inference does have implications for literature instruction. Literature teachers frequently encourage students to draw relationships between their own experiences and texts. However, we have little understanding of how

students link experiences and texts or how such linking does or does not enhance understanding; such information would be useful for teachers in conducting discussions of a text. It would also be useful for teachers to know how to exploit students' prior knowledge in order to help them extend their literary responses.

We do have evidence from both the NAEP literature tests and the IEA study (Purves, 1973) indicating age differences in readers' inferences. In order to explain these age differences, we need analysis that takes into account not only stages of readers' cognitive processing but also their prior knowledge of social and literary conventions.

Recent research on cognitive processing and inference (Omanson, Warren and Trabasso, 1978; Nicholas and Trabasso, in press; Stein and Glenn, 1978) indicates that readers use inferences about characters' beliefs or goals to make further inferences about characters' acts.

Readers bring prior knowledge in the form of prototypical ideas about characters' acts, beliefs and goals. They already know that, for example, a doctor typically tries to cure patients and that patients typically believe that the doctor is able to cure them. They also know that doctors typically have a strong desire to help others but that there are some doctors who work primarily for money and not for any humanitarian purpose.

When reading or viewing a story about a doctor/patient relationship in which a doctor requests that a patient undergo surgery, a reader uses these prototypical ideas to infer implied meanings of that requesting act.

In order to sort out these implied meanings, a reader also needs to infer the writer's intention in having the doctor make the request or in having the patient reject that request. Prior knowledge of how writers typically employ language to imply meanings develops from years of reading experience. The experienced reader knows that a writer is intentionally having the patient reject the doctor in order to develop conflict.

I recently piloted a study in which seventh graders retold sections of a story and answered some probe questions dealing with explanations of characters' actions. I was quite pleased with the subjects' rather extensive retellings of the story. Yet, despite elaborate recall, they had rather limited understanding of the story. They had difficulty explaining characters' actions in cases in which the characters' goals were not made explicit. They seemed incapable of determining the essential aspects of the story, particularly the characters' conflicting goals and beliefs. And they rarely deviated from their "literal-level" retelling to comment about characters' motives or define an overall theme. Older readers on similar retelling tasks are able to make some of these inferences despite the limiting nature of the retelling task and the fact that their retelling is often far less detailed than that of younger subjects. This is because they bring prior knowledge of the literary convention, "intentionality."

I have cited a few sketchy examples of how prior knowledge influences inference. These speculations obviously require some empirical verification. I would also contend that we need some theory as to the nature and development of prior knowledge.

Let me now outline a theory of prior knowledge in terms of social and literary conventions. Based on this theory, I will then propose a research project that will examine the influence of developmental differences in knowledge of social and literary conventions on literary response.

A THEORY: SPEECH ACTS AND CONTEXTUAL CONVENTIONS

The theory of the inference process that I am proposing is based on two types of conventions: speech-act and contextual conventions.

Speech-act theorists (Austin, 1962; Searle, 1968, 1975; Labov and Fansheld, 1977) define those conditions involved in performing certain speech acts. These conditions refer to speakers' intentions, beliefs, needs, abilities, or attitudes that are necessary and/or sufficient for successful performance of certain acts.

Speech-act theory assumes that words have meaning in the context of a sentence which can be imagined as part of an authentic language act. If a sentence does not occur in an actual speech context, which is the case with discourse acts embedded in fiction, readers create a speech context using their knowledge of speech-act rules (Brown, 1975).

Searle (1968) argues that an utterance involves three essential acts, the utterance act, the illocutionary act, and the perlocutionary effect. The utterance act, includes simply the act of uttering words in conformance to grammatical rules. However, such acts by themselves lack intentions which provide a meaning for the utterance. A parrot can perform utterance acts, but these acts are not part of authentic language use because the parrot's utterances lack intention.

In making an utterance, a speaker is also performing an illocutionary act. Illocutionary acts are those acts performed in making an utterance. If an audience or reader knows that certain conditions have been satisfied, he/she can infer that a particular utterance counts as a particular type of illocutionary act.

Different speech act theorists define these conditions in different ways. I prefer Labov and Fansheld's definitions or conditions as illustrated by their definitions of requesting rules, because they take into consideration

both the speaker's and the audience's beliefs about each other's intentions, needs, obligations, or sincerity.

For example, Labov and Fansheld define the conditions for performing a requesting act as follows:

> If A addresses to B an imperative specifying an action X at a time T, and B believes that A believes that
>
> 1. a. X should be done (for a purpose Y) (need for the action)
>
> b. B would not do X in the absence of the request (need for the request)
>
> 2. B has the ability to do X (with an instrument Z)
>
> 3. B has the obligation to do X or is willing to do it.
>
> 4. A has the right to tell B to do X.
>
> then A is heard as making a valid request for action.

Thus, if speaker A says to B, "The door is open," a reader could infer that A's utterance constitutes a request rather than simply an assertation because the reader determines that the conditions stated above have been met.

In inferring implied meanings from dialogue a reader explains the success or failure of an act in terms of particular conditions: the request to close the door may fail because the speaker wasn't sincere, the door didn't need to be closed, the speaker didn't have the power to make such a request, etc.

The fact that a reader knows the conditions as a set of schema means that he or she can infer a wider range of implied meanings than a reader who is less familiar with these conditions. For example, one set of conditions for making assertions intended to impart information has been defined by Paul Grice (1975). Grice proposes a Cooperative Principle (1975) which he believes governs the exchange of information in conversation.*

The Cooperative Principle states that a speaker should "make [his/her]

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*Some theorists would argue that the Cooperative Principle does not define speech-act conventions but is more of a rule of conversation. However, I would argue that the Cooperative Principle does define some of the conditions operating in making assertions, although not in the strict form of conditions that are necessary and sufficient for performing acts of assertions.

conversational contribution such as is required, at the state at which it occurs, by the accepted purpose or direction of the talk exchange in which [he/she is] engaged" (Grice, 1975). From this principle, Grice derives a series of maxims:

Quantity: 1. Make your contribution as informative as is required (for the current purposes of the exchange).

2. Do not make your contribution more informative than is required.

Quality: 1. Do not say what you believe to be false.

2. Do not say that for which you lack adequate evidence.

Relation: Be relevant.

Manner: 1. Avoid obscurity of expression.

2. Avoid ambiguity.

3. Be brief.

4. Be orderly.

Grice also suggests that a speaker, by intentionally (and in some cases, unintentionally) violating one or more of these maxims implies meanings beyond the meanings of explicit statements. Grice notes that speakers flout the maxim to draw the listener's attention.

For example, speaker A may deliberately engage in a lot of irrelevant digressions; both speaker A and the listener B know that the speaker has something important to communicate. A's intentional or unintentional violation of the maxim, "be relevant" could imply any number of possible meanings--that A is deliberately trying to avoid discussing another, more pressing matter ("beating around the bush"); that A is oblivious to the listener's needs; or that A has difficulty in coming to the point.

A reader could make these inferences by understanding that a particular maxim has been violated. A reader who recognizes that a character is being deliberately indirect or dealing with topics not relevant to a particular topic or issue, and is, therefore, violating certain maxims, is able to infer cer-

tain meanings implied by those violations (Cooper, 1977). For example, the fact that characters opt for more indirect forms implies certain attitudes or intentions--that they are uneasy with the situation or their audience. The character never states these meanings; the reader infers them as implied by the dialogue.

Inferring effects of acts

Another component of speech act theory is that illocutionary acts have certain intended and unintended effects, described as perlocutionary effects. By uttering the word, "Fire," a speaker is performing an illocutionary act of warning with the intended effect of frightening or alerting an audience. The ambiguity of utterances is often due to the fact that they represent multiple illocutionary acts: "The door is open" may count as an act of describing, requesting, ordering, or firing, which, in turn, can result in various effects of angering, impressing, persuading, or humiliating an audience.

Readers learn to use their inferences about effects to infer implied relationships. In responding to the following-- "I know of a really nice restaurant over in Oaktown," John said. "Sorry, but I'm working on a jigsaw puzzle," Mary replied--a reader could infer that John is describing or praising the restaurant. Or, by using Mary's response, a reader could infer that John was inviting Mary, or alternatively, that Mary erroneously interpreted John's assertation as an invitation. The fact that Mary rejects John's apparent invitation suggests that Mary holds certain beliefs about John.

When utterances are vague or elliptical, the reader must use the actual effect to comprehend the illocutionary point. For example, on the detective show, Kojak, a group of gangsters are discussing the fact that a gun dealer with whom they were working could squeal to the police. Their leader ends the discussion with the words, "Safety first." Another gang member then

responds, "We'll go get him." The viewer can infer that "safety first" is an order to kill rather than simply an assertation by using the gang member's response.

The reader also uses the actual effect to draw implications about the character and the development of the story. The fact that a character's initial invitation for a date is rejected implies that the character lacks status or is insincere or failed to perform the act correctly, possibilities which each imply something about the character.

Inferring implications

Knowledge of conventions also helps readers in recognizing that utterances or acts have a range of implications.

If character A requests B to do something and B refuses, the fact that B refuses could have any number of possible implications: that B dislikes A, that B doesn't think that A can make him do anything, that B will not cooperate with A in the future.

A reader needs to determine which, out of a range of possible implications, may be the most appropriate, essential or useful for understanding the text. One strategy for selecting implications is to recall prior obligations, beliefs, or conditions. For example, a reader recalls that A wants B to cooperate with him, that A likes B, and that A believes B to be of high social status. When B refuses A's request for assistance in some project, the reader has some parameters within which to limit certain implications. The implied reason for B's refusal may have more to do with matters of social status than desire or affiliation.

A reader can also limit implications by determining how an author is deliberately using an utterance or event to predict future events. A reader who knows the conventions of the "if you don't succeed, try, try again" story line can predict that after two failures a character will succeed the

third time around. Thus, within a well-defined narrative sequence each act implies a predictable subsequent act limiting the range of implications.

Aspects of discourse conventions involved in inference making

Let me summarize this discussion by listing some of the aspects of discourse conventions which are involved in making inferences:

1. speaker's beliefs and knowledge about each other
2. illocutionary intentions and intended perlocutionary effects
3. actual effects, reactions, consequences of an act
4. speaker sincerity
5. speaker ability, power, status, role
6. speaker needs, desires, goals
7. speaker obligation
8. appropriateness, necessity, function of act within a context

Contextual conventions

A second set of conventions that readers use in making inferences about dialogue is what I term contextual conventions. Contextual conventions are those norms, rules, conditions or expectations that define and regulate discourse behavior within particular situations or contexts.

Contextual conventions include two major types, social contextual conventions (discourse conventions that constitute social discourse behavior in such situations as classrooms, trials, debates, restaurants, religious ceremonies, courtship, salestalk, interviewing, CB radio talk, verbal games such as "sounding"), and literary contextual conventions (conventions that constitute narrative patterns--mystery, comedy, romance, tragedy, science fiction, etc.--or dramatic conventions).

Contextual conventions differ according to cultural, historical, or social milieu. The courtship conventions of 19th century British upper class society differ considerably from contemporary courtship conventions; under-

standing those differences has much to do with readers' understanding of Jane Austen's novels. The reader uses contextual conventions to determine the relationship between the writer or speaker of a text and the reader. A reader, knowing that a writer or speaker is telling the story of a romance, accepts and understands the use of certain stock devices. Similarly, when a listener is responding to someone telling a joke, he or she also accepts and understands that certain joke-telling conventions are in effect. In her book, A Speech Act Theory of Literary Discourse, Pratt (1977) discusses a wide range of discourse conventions that constitute different literary types or genres.

Having read a certain number of texts of the same type or genre a reader learns to recognize typical devices--that, for example, a mystery writer will deliberately withhold information in order to develop suspense. Included in these devices are dialogue acts that are used to portray certain roles, goals, beliefs, or attitudes. For example, in reading a play in which a trial occurs, readers already have certain schema in mind as to typical actions, beliefs or goals of prosecutors, defense lawyers, witnesses, jurors, etc.; they also know that certain types of acts are typically considered appropriate for certain roles--that judges are the only persons who can sentence, that lawyers ask the questions and witnesses answer them. The reader's expectations are often challenged by the violation of these conventions--a witness suddenly begins questioning a lawyer or declares her love for the judge--violations that create dramatic conflict.

Relationships between contextual conventions and inferences about speech-acts

While readers may know the conventions regulating speech-acts in a variety of different contexts (making a request in a trial does not differ markedly from making a request in a marriage ceremony, except for some dimensions of appropriateness) they may differ considerably in their knowledge of different

contextual conventions. Readers who are totally unfamiliar with the conventions of a marriage ceremony will have less understanding of a story involving such a ceremony than readers who are familiar with these conventions.

Speech-act conventions generally constitute individual disparate acts while contextual conventions involve sequences or relationships among acts. Readers who are familiar with contextual conventions may, therefore, be better able to draw connections or links among different speech acts. Pearson and Nicholson (1976) found that readers who were more familiar with the sequence of events involved in ordering a meal in a restaurant were better able to make inferences about a written passage about going to a restaurant than readers who were less familiar with what one does in going to a restaurant.

In order to recognize that a certain act constitutes a conflict or is part of a character's larger plan, a reader often takes an intermediate step, inferring that typically such acts are used to develop conflict or that typically the act is part of a larger plan. Once they have generalized about the act, they then have some basis for inferring that the act does indeed constitute a conflict or is part of a plan.

The process is not all that simple. In order to determine that an utterance or an act is functioning in a typical manner, a reader needs to define or create a context using their knowledge of contextual conventions. In some contexts, utterances function more typically to create conflicts than in other contexts. Knowing that a text is a murder mystery rather than a sonnet helps the reader infer that certain acts constitute a conflict because such acts typically do constitute conflicts in murder mysteries.

Let me illustrate this process with an example of a character's act "out of context".

If I would say that a character in a novel uttered the words, "Good morning, sir, nice day today," and then asked a reader to make some inference about the meaning of that utterance, they may then infer that they need more

information about its context. If I then said that the character was talking to a stranger on the street, it is then possible to create a context based on relationships between conventions constituting strangers walking on a street and the utterances appropriate for that context.

A reader may think that, typically, when you meet strangers on the street it is a nice gesture to greet them. Or they may think that if you meet strangers, you don't greet them. If a reader applied the first of these conventions to the utterance, they would infer that the character is being nice to the other character. If they applied the second convention, they would infer that the speaker is behaving in an abnormal manner. If a reader is given further information about the context, that, for example, the character was greeting his girlfriend's father, then a reader employs other sets of conventions: that in order to impress someone, you greet them and by impressing your girlfriend's parents you can improve your relationship with your girlfriend. A reader could then infer that the character is trying to improve his relationship with his girlfriend's father.

Readers also learn to infer links among acts in terms of the content of certain unstated propositions or ideas around which the story is revolving, propositions that are typical of certain narrative patterns. The content of the unstated proposition is often the goal of a character that none of the characters want to make explicit. For example, in a research project we are now conducting (Beach and Freund, in progress) high school and college students are being asked to make various inferences about Here We Are, a one-act comedy by Dorothy Parker about some nervous newlyweds on the afternoon of their wedding. The goal of the groom is to consumate their marriage; the goal of the bride is to delay that. Neither character explicitly states these goals, but knowing that these are the goals is essential to understanding the play.

Subjects who know the conventions of marriage behavior and comedy should be able to infer the underlying propositions or goals. In the one-act play the newlyweds continually discover some trivial reason to fight; and as soon as it seems that they have settled their dispute, another dispute breaks out. Some subjects were able to explain the characters' bickering in terms of their goals; other subjects who were not aware of the goals had more difficulty understanding the bickering.

Contextual conventions define the content of the speech-act conventions. A reader knows that villains violate a lot of speech act rules--they lie, they are insincere--because villains typically are not bothered by the fact that they violate rules.

Readers learn that within the context of certain narrative genres--science fiction, romance, detective, comedy, tragedy, etc.--certain acts are typically used to create dramatic conflict or develop the story. For example, in tragedy a character often performs a declarative act--banning daughters or condemning a son--that will later result in dire consequences. A reader, knowing the conventions, understands the importance or function of these acts in the drama.

Conventions and the inference process

Readers use contextual conventions to identify the social and literary norms of a text with highly formulaic works (mystery, romance, detective). In some cases, their initial inferences work well in helping them understand highly formulaic works. In less formulaic works readers must continually reformulate their inferences so that the characters' behavior begins to make sense. Consistent patterns in the characters' behavior imply some consistent relationship among actions, goals, intentions, beliefs, and/or roles and the "world" of the work. Gatsby's continual obsession with impressing others may be explained in terms of the social convention that in order to "get ahead," one must continually impress others.

Often social conventions concern behavior that is appropriate to social class distinctions. Within the social or hierarchical structure, a reader infers that certain speech acts are appropriate to certain roles. For example, a viewer watching Upstairs, Downstairs infers the following pattern of behavior:

1. Hudson, the butler, requests that the parlor maid, Daisy, "stop being so uppity." She reluctantly obeys.

2. Bellamy, head of the household, requests that Hudson bring in his dinner. Hudson obeys immediately.

3. Bellamy requests that his son, James, be more careful in his relationships with women. James tells his father that his relationships with women are none of his business.

Certain factors are consistently more crucial to the success or failure of the requests than other factors. In the case of Upstairs, Downstairs, the social status or role seems to be more important than, for example, sincerity or needs.

Summary of the model

In summary, I have suggested that:

1. In responding to literature readers go beyond inferring only characters' utterances to inferring characters' intentions, goals, beliefs, needs, traits, etc., that are implied by the utterances. Understanding a text has much to do with inferring these implied meanings.

2. Readers employ certain schema in the form of tacit knowledge of discourse conventions to make these inferences. Because readers already know the conventions constituting successful performance of certain acts or the conventions determining appropriate or typical behavior in a certain context, they can infer various implied meanings.

3. Differences in students' responses to literature may have much to do with their development in tacit knowledge of these discourse conventions, differences due to the extent or nature of their background experiences.

Determining the validity of their inferences

In making inferences about texts readers also attempt to test out the validity of their inferences. They know that some of their inferences--parti-

cularly hastily conceived initial inferences--will be less valid than other inferences. A reader may infer that a character was trying to be friendly to another character but then later recognize that this initial inference is invalid: that the character was really trying to butter up the other character in order to dupe him. This is not to say that the reader's initial inference was wrong. Rather, the reader simply learned some further information about the character that discredited the validity of the initial inference.

Testing out validity of an inference requires awareness of contingencies of the larger context which, in turn, involves prior knowledge. For example, a character utters the words, "There's a good movie coming to town next Friday night," an ambiguous speech act. One reader infers that the character is describing the movie. Another reader infers that the character is inviting someone to the movies. The second reader is more cognizant of the context that the character is a young male with a romantic interest in tne other character, a young female. Our second reader may then argue that such acts of inviting would be more "typical" under these circumstances than a describing act, given prior information about the characters' intentions, goals, and beliefs.

Testing out the validity of an inference involves conditional reasoning--determining whether certain conditions are operating for a particular act. For example, one reader, in testing out an inference about an utterance as "an order," reasons that typically, or normally, if the speaker is a boss and if a boss asks someone to do something, that's an order. The statement of the conventions in an "if-then" form is revealing: if certain conditions hold, i.e., if, among other things, the speaker is a boss, then an utterance constitutes an order and, furthermore, the reader also assumes that if a boss gives an order, an employee obeys. When a reader reads that one of the characters is a boss then he/she uses knowledge of ordering conventions to

infer that when the boss asks another character to do something, that utterance constitutes an order.

A reader's understanding of an act, therefore, depends not only on the reader's prior knowledge of certain conventions but also their ability to select those conventions that are most appropriate for understanding that act or text.

Selecting the appropriate conventions

In order to test the validity of an inference, a reader also must select those particular types of conventions that are most appropriate for explaining a particular act or situation. The conventions of romantic courtship are obviously more appropriate for making inferences about an exchange between a young couple than an exchange between a detective and a criminal.

Recognizing that certain conventions "fit" certain acts or situations is most important with texts based on distinct historical or cultural settings. With texts such as Pride and Prejudice, which constantly instructs readers as to the appropriateness of certain behaviors, readers need to be able to quickly learn social norms in order to understand the behaviors.

Knowing that a particular set of conventions is appropriate for certain social situations is a function of readers' ability to "size-up" situations and to try on certain types of conventions, an experience we encounter daily.

A proposed research project

I will now briefly describe a study based on this theory. In this study, still very much on the drawing boards, I will compare differences in both literary response and story telling/writing within and across subjects at the junior high, high school and college levels. This study will attempt to

examine the relationship between subject's prior knowledge of social, literary and ideological conventions and their responding or story production behaviors. I can only assume that subjects at these different grade levels will bring relatively different levels of tacit knowledge of these conventions to these tasks and that these differences will manifest themselves in subjects' inference behavior. (I will also attempt to examine within-group differences by examining individuals' responses in relationship to some indices of prior knowledge.) By comparing performance across grade levels I may then be able to argue that the differences generated in subjects' performance may be due to differences in knowledge of conventions.

Within each of these grade level groups, I will determine background reading and instructional experience; for example, amount of reading within various genre types and amount and nature of literature instruction. On the basis of this data, I will assign subjects to subgroups: high vs. low prior experience with literary reading and instruction. I will not be assuming that these determinations of prior literary experiences serve as measures of prior knowledge; I know a lot of students who have had a lot of literature courses and who have extensive "knowing that" theoretical knowledge of literature, but who have little "know-how" in responding to texts--these measures are indicators of prior experience, not prior knowledge. It would, however, be interesting to determine if any relationship between prior experience and prior knowledge (as manifested through inference behavior) does exist. I might add that I will not attempt to develop a test to measure theoretical knowledge of literary conventions because the problems with validity of such a test are so enormous.

Subjects would be asked to respond to a wide range of different types of texts representing different narrative genres. Some texts will be highly formulaic, some not; some will contain social situations that will be familiar to subjects and some situations that will be unfamiliar. Such a range is

necessary in order to compare performances across different types of texts and social situations. With texts containing presumably familiar situations--a romantic proposal scene from a love story--subjects' group performance may differ from their performance with a less familiar text or situation.

In order to study differences across individual subjects' performance in relationship to their own unique prior knowledge, I will attempt to ascertain their knowledge of prototypical characteristics of certain narrative types and social situations.

Prior to reading some of the texts, subjects will be asked to make inferences about certain types of literary texts, character types, character goals, acts, intentions or beliefs. For example, prior to reading a detective exerpt subjects would be asked to indicate the story line for a detective story or the typical goals and beliefs of a detective. This data about subjects' general knowledge about prototypes could then be compared with their inferences about instances of those prototypes. With texts that violate stereotypical assumptions, I will attempt to determine subjects' ability to recognize conflicts between their expectations and the text.

Subjects would also be asked to write or tell about everyday incidents in addition to writing short fictional pieces. They would be asked to respond to their own writing, particularly in terms of their intentions. I would then be able to analyze the relationship between subjects' articulated intentions and their realization of those intentions. Comparisons can then be made between subjects' articulation of their own intentions and their awareness of authors' intentions.

Because I am interested in analysis of specific inference strategies, with some of the texts, subjects will be asked to "think aloud" about their responses on a line-by-line basis. While such "slow motion" reading does not approximate normal reading behavior, I have found that this technique allows for analysis of inferences about specific utterances. It is then possible

to make comparisons across different speech act types to determine differences in inference strategies due to differences in the type of speech act.

Analysis of line-by-line responses also provides information about relationships among inferences about acts, beliefs, goals, consequences, traits, and imputed reasons. If a reader infers that a character has a certain goal, then that reader may also infer that the character will act in a certain manner. Analysis of these relationships would indicate how a reader uses his/her initial inferences to make inferences about subsequent segments--the relationship between prior text-derived knowledge and new information.

In some cases, a reader may propose optional inferences or implications for the same lines. He/she may then be asked to indicate which of these inferences is the most valid and how they made that decision.

Subjects would also be asked some questions about the social situations or literary prototypes contained in these texts. For example, if a text contains a job interview, subjects would be asked to define the goals, plans, beliefs, speech acts, speaker roles or traits, strategies or value assumptions that typically hold in job interviews. Or, if a text is a "love story," subjects would be asked questions about the goals, plans, beliefs, etc., typically held by characters in this genre.

Both during and after their responses subjects will be asked various probe questions about the reasons they impute for characters' actions and the reasons for their own inferences, reasons that may reflect assumptions influencing each subject's responses.

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Problem-Solving Strategies in Writing: Evaluating The Critical Skills

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PROBLEM-SOLVING STRATEGIES IN WRITING: EVALUATING THE CRITICAL SKILLS

If there is one thing you can expect a college dean, a professor, and a student to agree on, it is that writing is a problem. It poses a difficult question for everyone: What is good writing; how do you teach it; and, what is worse, how do you learn how to do it?

Because traditional notions of teaching, learning, and evaluation are being called into question, colleges are being forced to make the goals of their composition program clear. In particular, this means defining the writing skills we think a college graduate should have.

This paper is a response to that problem. Its central goal is to identify some of the critical skills which underly "good" writing and which should, in turn, guide evaluation. I am going to suggest that these critical skills are not the editing skills so often traditionally associated with composition, but are instead, problem-solving skills. Effective writing requires higher-level skills than editing; it is produced by people who have (1) strategies for composing written speech (for knowing how to write) and (2) strategies for communicating to someone else (for adapting one's knowledge to a reader).

Evaluation and Goal Setting

In setting goals, the role of evaluation is always problematic. Evaluation is first of all a support service to education. By forcing educators to define goals and then measure hard results against grand desires, it keeps everyone honest and at the same time, it lures us to invent a better way. In the field of composition, evaluators are now asking, Just what is it composition courses do teach and how can it be measured--and that, I think, is a very good

and long overdue question to ask. At the same time, the practical reality of evaluation is that it tends to set up goals in its own image. That is, it can encourage a school to teach primarily those things it can evaluate. And here is the problem: when the mechanisms for evaluation are not particularly sophisticated, as they are not in writing, they can lead us to set relatively unsophisticated goals for a writing course, such as "correctness" in writing. When this happens, we have let a support service become our program director.

I raise this point about evaluation--that it can become a tacit way of setting goals--because I think we need to teach skills which are relatively difficult to evaluate, certainly more difficult than errors of grammar, mechanics, usage. Measurement is hard not because these higher skills are themselves fuzzy or vaguely "affective," but because they are realistically complex, intellectual skills. Let me explain this in more practical terms.

The Nature of the Writer's Problem

If we look at writing from the writer's point of view, writing is itself a thinking problem. Spelling, punctuation, grammar, usage, even stylistic control are all necessary supporting skills--editing skills--and they do have the virtue of being measurable. But they are not the critical skills you and I use when we sit down to write. As anyone knows, who has written a diplomatic note, a scholarly paper, an interdepartmental memo, or an administrative report, writing is a rhetorical act. To do it well a writer does not simply express a stream of thought; instead, he juggles a number of constraints, often balancing one against another. Whatever he chooses to say must meet the demands and constraints of his purpose in writing, his reader's need in reading, and his own large, complex resevoir of stored information. Good writing is not bad

writing with errors removed. "Good writing" is a cognitive skill; it is the result of knowing how to write.

If we look at this skill from a psychological point of view, writing, like other forms of creative thinking, is essentially a problem-solving process. This means two things: (1) writers have to perform a number of mental tasks just to get something on paper. Such task include making plans, generating ideas, forming new concepts, specifying relationships, running editing checks, etc. It's a complicated process. (2) Secondly, like all problem solvers, writers use mental strategies or heuristics to manage this complex process. Such heuristics might include brainstorming, planning, trying to "talk it out," or simulating a reader's response. Some writers have a well-developed set of such heuristics and the self-conscious control to use them as they write. Other writers appear to depend on more limited or downright ineffective strategies when they compose and lack the power to evaluate and guide their own process. One of the most suggestive implications of my own research with John R. Hayes into the writing process is that good writers are not different in kind from the rest of us; they are simply doing some things differently.

Let me sum up. Whether we look at writing from practical experience or from current psychological research, we see that writing is not simply a matter of expressing oneself within the rules of correct English; it is a complex mental and rhetorical act that has to integrate intentions, knowledge, and audience--as well as written form. Within this rhetorical situation, knowing "how to write" is a cognitive skill that depends on the writer's access to a repertory of problem-solving strategies.

Goals for a Composition Curriculum

When one is designing, teaching, or evaluating a writing curriculum, one of the first questions to ask is, "What skills do we expect the students to learn?" By defining those skills we set the goals for teaching and the standards for evaluation. Therefore, a question you might be asking now is "What do we stand to gain, as educators, when we define a writer's critical skills as problem-solving skills? There are, I think, two significant advantages to defining our goals this way:

1. The first advantage is that by teaching problem-solving strategies we get more dramatic results out of the teaching that is done. By focusing on the writer's thinking process, we teach people how to go about the task itself; how to write, not how to edit. We increase the cost/benefit ratio of instruction because we are able to intervene earlier in the process, to give help where it's actually needed. For some schools this might also be a way to integrate writing instruction into the rest of the curriculum, as the responsibility of departments other than English alone.
2. A second advantage is that the skills we teach will have a long term practical and professional value to our students. Problem-solving skills may be the critical variable that determines one's overall success as a writer both within college and after.

Identifying the Critical Skills

In this paper I have been urging a radical shift in our goals for teaching composition. In confronting writing, I think it is time we realized the real nature of the beast. The failure of traditional instruction convinces me that by setting limited and unsophisticated goals, such as correctness, we

will only get limited and unsophisticated--and probably not even correct--writing. The critical skills behind writing are essential problem-solving skills. Furthermore, by raising our sights, by trying to teach and evaluate what really counts, I think we will discover that we can increase both the effectiveness and the value of teaching. Let me support those propositions by describing two of the important strategies we can teach: strategies for the act of the writing itself and strategies for communicating.

Strategies for Communicating

Writing is a complicated process. If you want to change or improve that process it does little good to concentrate exclusively on a poorly written but dead and finished product. Much of the current history of composition teaching has shown us this. If you want to teach people how to write--to change their behavior--you need to intervene in the process. Treating writing as a problem-solving process lets you do exactly that (L. Flower and J. R. Hayes, "Problem-Solving Strategies and the Writing Process", College English, 39 [Dec., 1977] p. 449-461.) It asks researchers, teachers, and evaluators to define some of the critical skills good writers actually use when they write and to diagnose some of the typical problems people run into.

Here is an example of how such research can be directly converted to teaching. What follows is a simulated transcript or "protocol" of a writer trying to compose. In the experimental situation, the writer is trying to say out loud (into a nearby tape recorder) every thing that goes through her mind as she writes--all the tentative ideas, trial expressions, and wayward thoughts that characterize writing.

This simulated transcript is used in class to show students a typical problem often created by a weak writing strategy. As you read it, try to

analyze the strategy behind the writer's process. The subject starts out by identifying herself.

> This is Jo Banta. I'm writing an analysis of writer's block. Alright. In today's world . . . for today's student, writer's block is a matter of great concern. . . of universal concern. In today's high pressure education, writer's block is a question which plagues many students. . . . In today's high pressure education. . . In the high pressure education of today, writer's block is a problem of great, of universal concern which plagues. . .In high pressure education writer's block is a matter of almost universal concern. . . .In high pressure education of today, one problem which plagues many students is. . . .This is a problem because. . . .Writer's block is a problem because. . . . Due to the phenomena of writer's block. . .Because of its omnipresence, many writers fail to hand in assignments on time and thereby lose,. . .and they thereby receive, . . .they get lower grades. Because of the omnipresence, because of writer's block . . .oh what the hell do I know about writer's block. I think I'm having it! How can I write about writer's block when I'm in the middle of it!! What an awful assignment. Wonder what dinner will be tonight. Boy, that window's dirty.

This writer has a familiar problem, which we call a Top Down block. Instead of planning, brainstorming, jotting notes, or identifying her goals, she has started out by trying to produce a perfect set of sentences. She is trying to work from the top, straight down, generating her ideas and language in the flowing sequence of a finished text. The form of the product is dictating the form of her mental process.

Because there is no developed guiding plan (except to produce acceptable sentences) her writing looks like a trial and error procedure. Sentence one is a testing ground for six alternative expressions:

in today's world	a matter of
for today's student	a question which
in today's high pressure education	a problem of

However, due to the limits of Short Term Memory or attention, the writer is unable to consider all possibilities at once and make an efficient decision and so frequently returns to previously rejected versions. Furthermore, in that first sentence alone, there are at least 104 possible combinations and transformations she might conceivably try. Writing a paper sentence by sentence can be a slow and frustrating process.

The Top Down strategy, as common as it is, also fails because it asks writers to do an enormous number of difficult tasks all at once. In laboring over this introductory paragraph the writer is essentially trying to create a plan for the paper. The paragraph may take hours to write because it serves to articulate and organize her ideas and predict the thrust of the entire paper. This is obviously a substantial task in itself which might be best done with techniques like brainstorming or building an issue tree. The writer, however, has further constrained the task by trying to produce flowing text at the same time. To the initial problem of "what should I say," she has added all the extra demands of formal prose: grammaticality, punctuation, spelling, conventions of usage plus considerations of voice, rhythm, tone, and other questions of style. When a writer rushes into producing a final text as a way of starting to write, the result is often frustrating. Trying to make a smooth transitions from one idea to the next, when you have not yet articulated the second, is like trying to build a bridge into the fog: it's hard to know if you're going in the right direction until you get there. The cost in quality and effort of this risky strategy is often high.

Strategies for the Writing Process

A second critical skill reflects the social function of writing. Writing is a national headache, not merely a problem for English teachers, for two reasons. First, because it is tied to learning and intellectual growth in college. Secondly, because it is a highly practical often essential skill in jobs and professions outside the university. The ability to write is a significant part of the general all-around competence college graduates are supposed to have.

If we look at a college graduate five or ten years out of school, at someone like ourselves or at people who work in other businesses and organizations around us, what are the skills they need? In business, most readers are relatively unconcerned about refinements of usage and style beyond basic competence. What they do care most strongly about is getting a memo or report that can come to a point, focus its ideas, and meet their information needs as a reader. Good writing is intensely functional. By contrast, poor writing may merely express information--and often at great length. The critical skill for writers in professions is probably the ability to develop a strategy for communicating with someone else. That means that the writer can reword, reorganize, or even rethink what he or she knows in light of a mutual goal shared with the reader.

For example, suppose an architect were asked to write a report for a group of City Commissioners on the subject of Energy Conscious Construction. Thinking about the paper she would natrually start with her own knowledge of architecture organized under such categories as Methods, Materials, Styles, and Functions. We can imagine her knowledge stored like a giant loose-leaf encyclopedia, organized perhaps into categories like a comprehensive architecture textbook. Within each of these categories or units she would have

stored certain relevant bits of information about energy. (Some of the frequently used pages would have tabs for easy access; other stored ideas would be more difficult to find.) In discussing the subject the writer could simply take a mental tour through this established network of ideas, flipping through pages in their textbook order. If, on the other hand, our architect wanted to make sure she communicated with her audience, she might have used a different strategy for expressing her information. For example, she might have reorganized her knowledge into new categories which she and the audience would share, such as:

Major Sources of Energy Loss in Buildings	Practical Measures to Conserve Energy Now	Measures for the Future

A communication strategy would take into account the different conceptual framework of the commissioners and their need to use this information to act. Effective writers must draw on such problem-solving skills in order to deal with the problem of communication itself.

From a practical and professional point of view, problem-solving strategies for communication are probably the critical writing skills college graduates need. On top of this, a recent study by Howard Bowen (Investment in Learning: The Individual and Social Value of American Higher Education, San Francisco: Jossey-Bass, 1977) suggests that such skills are the only ones a graduate might actually retain. As everyone knows, the half-life of memorized detail from courses is remarkably short. "Most studies show that 50 to 80 per cent of what is learned in courses is lost within one year." In terms of composition, this means that we can indeed teach and happily measure rules for style and usage (don't split infinitives, don't join independent clauses with a comma), but the long term effect for all our effort may be small. We may have missed the larger relevant variable that determines practical success in writing. According to Bowen what does remain from education will be broad general principles, ways of looking at the world, and the ability to learn. In essence, we remember not rules but strategies for solving new problems. In addition,

teaching experience suggests that when students see writing as a legitimate problem in communicating, they find a rationale for learning many of the lower-level editing skills we couldn't motivate them to learn directly.

Evaluating Problem-Solving Skills

The critical skills and problem-solving abilities that underly writing are harder to measure than editing skills, but means of evaluation do exist and are being developed. One large scale approach is the Primary Trait Scoring method developed by the National Assessment of Educational Progress and described by Richard Lloyd-Jones in a recent book, Evaluating Writing, (Charles Cooper and Lee Odell, eds. [Urbana, Ill.: N.C.T.E., 1977]) The Primary Trait method evaluates the writer's ability to carry out certain appropriate rhetorical strategies in light of the aim of the discourse, when that aim or purpose is to persuade, explain or express.

An even more ambitious approach is the Competence Assessment methods developed at Alverno College in Milwaukee. Alverno College, with the support of the Fund for the Improvement of Post-secondary Education has done an impressive job of defining the abilities or educational "outcomes" their graduates should have. In communication, these skills are arranged in levels of difficulty from the ability to analyze self-performance and other models, to the ability to create a fully integrated presentation. At the Assessment Center students must demonstrate actual competence in each specified area in order to graduate.

Another approach to evaluation would define critical qualities of the text that account for success in writing. Some of the most promising work in this area is E. D. Hirsch's study of "relative readability"--the effectiveness of a text judged in light of the writer's aims (The Philosophy of Composition [Chicago; Univ. of Chicago Press, 1977]).

Hirsch argues persuasively for "relative readability" as the central, historical principle behind effective writing. By drawing on recent research in information processing, his work promises to offer a measurable yet sophisticated analysis of the relative ease with which prose communicates its meaning to a reader.

A final approach would seek to evaluate the writer's process itself, or more specifically, the skills and procedures writers need to know in order to produce effective writing. In this direction, J. R. Hayes and I have been studying some of the problem-solving strategies that distinguish good writers from poor writers ("Plans and the Cognitive Process of Writing" in Writing: The Nature, Development and Teaching of Written Communication, eds., C. Frederiksen, M. Whiteman, and J. Dominic, forthcoming.) For example, good writers engage in substantial amounts of planning throughout the writing process. In addition, they spend time building for themselves a far more fully developed internal representation of their rhetorical problem (of their goal, their audience, and their own role). And unlike poorer writers, who seem tied to the text or dependent on a "flow" of ideas, good writer frequently stop, review the problem from the top, and plan alternative strategies for reaching their goal.

Another critical cognitive skill is the ability to take one's reader into account. This often involves transforming one's own Writer-Based prose to a more publically structured Reader-Based prose. Writer-Based prose is a comfortable, natural form of interior monologue will adapted to recovering information from memory or talking to oneself. It is not, however, well adapted to the needs of another mind, of a reader. The egocentric focus and narrative or data-bound structure

of such writing produces those all too familiar reports or papers focused around the writer's discovery process, not the issue at hand. Reader-Based prose, by contrast, typically creates a hierarchically structured discussion focused around a problem or point of mutual interest to reader and writer.

Being able to make this transformation from Writer-Based expression to Reader-Based prose is an extremely useful skill. Like planning, it is also a teacheable skill, so that evaluation of a writer's current problem-solving process becomes a plan for what he needs to learn.

Let me conclude by returning to my original premise. Writing itself is a problem-solving process. Its success will often depend on the strategies and procedures the writer calls on to accomplish the task. By trying to define and evaluate the critical skills that underly this thinking process, we can not only be more effective in teaching, but we could end up teaching the fundamental and long-lasting abilities educated adults actually need.

Ordering Sentences Into Coherent Stories

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Running Head: Ordering Sentences

Abstract

To investigate the strategies children use in comprehending written stories, third, sixth, and ninth graders were given scrambled six-sentence stories and asked to reorder them. Three versions of each of six stories were created. The first version was the canonical form of the story which followed a normal event sequence; the second version began with a sentence questioning the conclusion of the canonical form, while in the third version this conclusion began the story. The results show that the canonical form is more easily ordered than are the other structures and also that third graders are much less accurate at the task than are sixth or ninth graders. It is apparent that children rely on an event-sequence strategy and fail to attend to many surface text features. The results suggest that the gist of the story is of much greater importance in comprehension than are features of surface structure.

Ordering Sentences into Coherent Stories

Analysis of the relationship between story structures and how people perceive and remember stories is a potentially important advance in studying reading comprehension. In comparison to short answer questions typically used to measure reading comprehension, story structure tasks represent text-level means of describing story difficulty and of categorizing comprehension of a whole text or selective elements of a text. Additionally, through analyses of errors, questions about planning behavior, text complexity, and influence of background knowledge become accessible for study.

Unlike multiple choice comprehension tests, a story structure task avoids awkward decisions about which text details to select and how to choose foils for multiple choice items. Attempts to organize or remember stories when analyzed in terms of a story structure also suggest how information that is read has been processed. (This analysis is possible because when the structure of a story can be defined, what a person reports to be its structure allows an interpretation of attention in reading.) In fact, it is irrelevant whether organization or recall responses are considered errors or different interpretations because in either case the responses suggest an alternative organization of what was read. While multiple choice comprehension answers given in typical reading achievement tests indicate which particular details are comprehended, attempts to organize stories suggest why information is embellished, omitted, or transformed.

We have posited that story structures help readers organize stories (McClure, Mason, & Barnitz, 1979). A well-formed or canonical structure

follows an expected temporal sequence, providing a tie between the information contained in stories and a reader's internal representation of that information. The canonical structure often has a causal ordering in the sense that each part of a story can be perceived to cause directly the occurrence of an event that follows or to establish the necessary preconditions for that event. For example, the canonical form of one of our stories (an example is at the top of Table 1), contains the sentence, "The border police searched it but could not find anything." It has the precondition sentence, "One day a suspicious truck drove up to the border" and is followed by causally related consequences.

Insert Table 1 about here.

Since the canonical form of a story is in accordance with the ordering of natural events and expected consequences, that type of story form is familiar to children. In the story just mentioned, after reading that a suspicious truck drove up to the border and that the police could not find anything, readers might predict a sequence about drug smuggling where the police would find some way of foiling the would-be smugglers.

The canonical form should be easier to comprehend than one which does not fit a natural ordering. In this story, continuing with a set of events which describes how the police find hidden drugs permits an easy understanding because the schemata for comprehension are already in place. If a story violates the canonical form, the reader may have difficulty maintaining the text structure that is presented. For example, a noncanonical form described at the bottom of Table 1 begins, "The border police have found a new helper

that drug smugglers cannot fool," and continues with, "One day, they searched a truck which they thought contained drugs." Although with the exception of the first sentence, this version of the story follows the same event sequence as the canonical form, this flashback version seems more difficult to comprehend. Whether it is more difficult for children can be tested by contrasting comprehension errors made under the canonical and flashback conditions, for example, by comparing attempts to order sentences to form a coherent story.

We presume that a story becomes even more difficult if other taxing conditions exist, such as inclusion of an unfamiliar term or concept that presupposes particular inferences. For example, in this story readers who did not realize that "border police" probably referenced police on the U.S. -Mexican or -Canadian border or that "drugs" meant illegal contraband or that a German Shepherd is a dog would be unable adequately to understand the story. Problems of this sort can be discovered by studying differences in errors made when readers deal with differing kinds of story structures and by employing follow-up probe questions about the concepts.

Story structures have been considered recently by Rummelhart (1975, 1977), Mandler and Johnson (1977), Stein and Glenn (1977), and Thorndyke (1977), among others. A well-formed story is usually described as containing two parts; the first part is a setting which indicates an habitual state or action while the second is one or more episodes, where an episode indicates the sequence of events and reaction of the main character(s). Stories may vary from this basic form, however, and often do in adult literature by containing elaborate episodic structures, by stating some episodic portions

indirectly, by using an associative rather than causally related structure, or by using flashback or other linguistic devices which allow a deviation in structure. In fact skilled writers make deliberate use of noncanonical structures to highlight information, lead the reader to construct alternative interpretations, redirect the reader's attention, or for other reasons (see Prince, 1973).

There is no reason to suppose that children are as facile as adults in realizing that an author has chosen a noncanonical form of a story. Noncanonical structures have a less familiar quality, particularly for children who, because they have not read many stories, have had little experience with alternative structures. For this reason, noncanonical structures could be miscomprehended as though written in a canonical form. For example, in the flashback form of the drug smuggling story, a serious error would be made if the reader surmised that first the border police found a helper, then they stopped a suspicious truck but couldn't find drugs, and then they led a German Shepherd to the truck. The relationship between the helper and the dog would never be properly interpreted. Much of the meaning of the story as a whole would be lost. By contrasting the canonical form of a story with a flashback form in a story reconstruction task this potential problem is addressed. These results can provide valuable insights about what readers rely on in reading and under what conditions a reconstruction task becomes impossible.

These issues have been raised in two studies. In one, over two hundred rural and small town children, three classrooms each from grades three, six, and nine, participated (McClure, Mason, & Barnitz, 1979). In another,

Hispanic, Black, and White children from schools in a large city were tested. (McClure, Mason, & Williams, manuscript in preparation). In both studies, children were given mixed sets of six sentences which, if correctly ordered, form tightly constructed, complete stories. For each of six stories three versions were constructed, a canonical form, a flashback form, and a question form. Children were given two stories of each form, six stories altogether. Children were asked to read the scrambled sentences and place a 1 next to the sentence that they thought should be the first in a story, a 2 next to the second sentence, and so on to the sixth. They were then asked to reread the sentences in their chosen order to make sure that it was a sensible story.

We have studied several methods of scoring with respect to their usefulness in interpreting processing activity. Three which are the most promising will be described. The first is a totally correct sequence, correctness having been defined as an ordering most frequently agreed upon by skilled readers. The second is a pairs-correct score: for each story a point is given for any two sentences which appear in the correct consecutive order. There being six sentences in a story, a score ranges from 0 to 5. Referring to the example above, a child who follows ". . . led a German Shepherd to the truck" with "He sniffed at the truck floor . . ." whether ordered 1-2, 2-3, 3-4, 4-5, or 5-6, would receive 1 pairs-correct point for that pair. The third score is an initial sentence correct score; this score determines whether or not children recognize that the canonical structure begins with the setting sentence, the flashback structure begins with a conclusion, and the question structure begins with a summarizing question.

The results listed on Table 2 confirm the hypothesis that the canonical form is the easiest to order. For all three scoring systems, the canonical form was significantly easier than either of the other two forms. There was also a striking improvement over grade in an ability to order all three versions of each story. Correlations between these scores and standardized reading achievement scores ranged between .32 and .77. This suggests not only that the task of reconstructing these stories is closely related with achievement test scores but, as important, that more skilled and mature readers are more adept at using story structure and syntactic clues.

Comparing the three types of measures, there is a greater effect of story structure on the total order and initial sentence measures than on sentence pairs. That is, the flashback and question forms are about twice as difficult as the canonical form for the first two mentioned measures but only somewhat more difficult for sentence pairs. Another difference is a smaller grade effect for the sentence pairs. The reasons for these differences lie in the nature of the measurements themselves. The initial sentence measure taps the first critical judgement--recognition of the most appropriate beginning sentence, appropriateness being determined both by knowledge about how to order the gist of the story and by knowledge of syntactic conventions which eliminate otherwise possible alternative orders. While the total order is also dependent on a correct choice of the first sentence, the sentence pairs score measures sentence by sentence recognition of closely related information. The results indicate that children, even third graders, are nearly as able to select sequential pairs of sentences in noncanonical forms as in the canonical form of stories.

Insert Table 2 about here.

Before describing the errors made, it is important to point out that although there are 720 possible orders of six-sentence stories, we seldom received from the children more than 20 different orderings of a story. The reason for this became clear when we analyzed the kinds of errors that were made. When the story line was familiar most of the children were able to construct a satisfactory and similar gist; where they failed was in accounting for syntactic conventions and markers which signaled a devient story structure. When the story line was not familiar or children were not good readers, more devient structures overall were noted; nevertheless, the same pairs of sentences were still selected and commonly occurring markers were chosen to begin or end a story.

A description of the errors made for the two versions of the drug smuggling story from Table 1 will help to clarify these points. These errors were made by sixth and ninth grade students. We did not include third graders' errors in this analysis because their errors were less consistent as a whole.

The most common error of the canonical form of the Table 1 story with 16% of all responses was the order 3 6 4 2 5 1 (left most column). The conclusion sentence ("They had also found a new helper . . .") was placed in the middle to suggest that the police were looking for a helper, and then they led the dog to the truck. Thus, the children correctly inferred that the dog was the helper but, by placing the last sentence in the middle of the sequence, must have ignored the marker, "also" as well as the verb tense.

Scoring this order would be 0 for total order, 1 for the initial sentence and 3 for sentence pairs. A second error type, with the same 0, 1, and 3 scoring is order 2 6 4 3 5 1, second column. It is similar in structure to the previous error order in that the conclusion sentence was placed in the event sequence. Also, in this order it is unclear that the German Shepherd is the helper as the indefinite article a rather than definite article the is used with German Shepherd as if German Shepherd is the first identification of this character. With the third error type, 6 5 2 4 3 1, the sentence pairs score is 2. Here, the children ignored a need to define beforehand who led the German Shepherd to the truck (their second sentence) but otherwise they constructed a plausible, though slightly different, story. Notice that in all of these error sequences children recognized the correct first sentence, constructed a sensible event sequence (gist), and observed the lexical tie between "led a German Shepherd to the truck" and "He sniffed at the truck floor."

There were a greater number and variety of errors from the flashback form of the story shown at the bottom of Table 1 with seven different orders accounting for nearly 50% of all the responses. About eight percent of all the students made each of the following typesof errors.

One order, 1 4 3 5 2 6, the left most column, is actually the canonical form of the story. Students choosing this order certainly preserved the gist of the story. However, notice that in choosing as the first sentence, "One day, they searched . . .," children not only ignored the need to identify who had searched a truck, but also ended the story with a sentence whose

tense is incorrect for that position. Scoring for this order is 0 for total and initial sentence measures and a 3 for sentence pairs. The second error order, 1 3 2 4 5 6, also uses the c[illegible]al form except that the sentence, "But they did not find anything" was not placed in the event sequence. Put last, it creates an anomalous ending for the story. Perhaps students could not find a place for it so left it last. The pairs score is also lower, 2. A third error ordering, 1 4 3 5 2 6, is somewhat similar to the first mentioned canonical story error order in that the conclusion or flashback sentence is placed in the event sequence but also has the same anomalous ending as the last mentioned order and a sentence pairs score of 2. A fourth error order, 2 4 3 6 1 5, correctly begins with the flashback sentence but misplaces the sentence, "But they did not find anything." Similar to the third mentioned error order of the canonical story, the story is nearly an acceptable sequence and has a sentence pairs score of 3. Notice again that all of these error orders observed the lexical tie between "led a German Shepherd to the truck" and "He sniffed at the truck floor." Also nearly all error orders from the noncanonical structure resulted in children being misled by a flashback: they followed the normal canonical structure of a story and such story structure conventions as beginning a story with a phrase such as one day, but they ignored referential conventions. That is, they tried to begin the story with the setting and initiating event rather than making certain that nouns preceded pronouns referring to them thus ensuring clarity of reference.

Conclusion

The information presented for two versions of the drug dog story is prototypical. The most striking finding interpreted positively is children's ability to construct an acceptable gist. However, this finding also may be negatively interpreted as reflecting blind attention to an event ordering. Such attention is exemplified in two ways. First, the canonical form was strongly preferred even by ninth grade children, and even at the expense of ignoring rules such as using a full referent for a noun before a restricted referent or of ordering verb tenses. Second, the event sequence was often elaborated on in ways we had not expected, usually by placing the conclusion sentence in the event sequence. In the drug-smuggling story, this occurred when the sentence about finding a new helper was placed in the middle of the story. Another story about a pilot who had to jump out of his plane was designed to end with the sentence, "He had fallen three miles and lived." Many children placed that sentence in the middle of the event sequence using it to refer to event of falling. These errors suggest that verb tense might often be ignored by children when they read, for only by imagining a reading in which tense is ignored can these orders be made sensible.

The first and second findings are closely related. Children, even ninth graders perform best on the ordering task when stories conform to a canonical structure, supporting the notion that children understand and rely on this structure. Evidence that they ignore rules for pronominalization, sequence of tenses, and ellipsis as well as making unconventional use of deictics and conjunctions (see McClure, Mason, & Barnitz, 1979) suggests

that children operate more with the propositional content of sentences than with elements of surface structure. Children, especially younger children, appear to attend only to very obvious surface clues--salient lexical ties and common markers such as first, finally, or one day. Thus, the underlying canonical structure is the principal basis for organizing story information while, as children become better readers, increasing attention is paid to relevant rather than merely common surface characteristics. This means that a story reconstruction task offers valuable insights into children's comprehension processing and ought to be considered as an alternative means of measuring reading comprehension and of studying comprehension processing.

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Table 1

Two Versions of a Story

Canonical form

e	e	e	c	
3	2	6	6	They had also found a new helper that drug smugglers could not fool.
6	6	5	5	Pulling it up, the police found a fortune in drugs.
4	4	2	3	Then they led a German shepherd to the truck.
2	4	2		The border police searched it but could not find anything.
5	5	3	4	He sniffed at the truck floor.
1	1	1	1	One day a suspicious truck drove up to the border.

Flashback form

e	e	e	e	c	
1	1	1	2	2	One day, they searched a truck which they thought contained drugs.
4	3	4	4	5	He sniffed at the truck floor.
3	2	3	3	4	Then they led a German shepherd to the truck.
5	4	5	6	6	Pulling it up, the police found a fortune in drugs.
6	5	2	1	1	The border police have found a new helper that drug smugglers cannot fool.
2	6	6	5	3	But they did not find anything.

Note. The correct order of these stories is denoted by the column labeled C. Error orders are presented in other columns.

Table 2

Percentage of Correct Responses as a Function of Grade and Structure[1]

	Total Order	Sentence Pairs	Initial Sentence
Grade three			
Canonical form	10	34	55
Flashback form	5	31	23
Grade six			
Canonical form	46	68	90
Flashback form	20	53	37
Grade nine			
Canonical form	64	81	96
Flashback form	38	71	61

[1]Data reanalyzed from McClure, Mason, & Barnitz, 1979.

Procedures for Exploring Writers' Cognitive Maturity

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Lee Odell
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

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In his work on syntax, Kellogg Hunt (1965; 1977) has raised basic questions that have influenced researchers and teachers of composition for the past decade: What syntactic structures are characteristic of the work of relatively mature writers? Are there structures that frequently appear in the work of mature writers that rarely or never appear in the work of less mature writers? Quite apart from the specific insights these questions have led to, Hunt's work seems important because it has provided teachers and researchers with an empirically derived goal toward which a composition program might work. One may conceive of that goal rather simply as a matter of increasing the complexity or the length of T-units in students' writing. Or, more justifiably, one might view that goal as one of increasing the range of syntactic options available to students. In either case, Hunt has shown us that we can define some aspects of mature writing and can use that definition to guide our work with student writers.

One problem with Hunt's work is that his notion of syntactic maturity has no clear relation to a writer's cognitive maturity. Hunt allows us to think about growth in writing without considering growth in the cognitive processes that enable one to produce a piece of writing. This situation troubles me because I assume that, Donald Hirsch's arguments notwithstanding, researchers and teachers of writing must be concerned with "quality of ideas" and that the "quality of ideas" is related to the quality, the maturity, of the cognitive processes that produce a given piece of writing. What I wish to propose is that those of us who are interested in the cognitive processes writers employ are in a good position to re-formulate the basic questions Hunt has posed: From the standpoint of cognitive psychology, what distinguishes the work of relatively mature writers from that of less mature writers? Are there cognitive strategies--i.e. patterns in the ways people examine and reflect upon experience-- that typically appear in the work of older writers and that rarely or never appear in the work of younger writers?

It seems likely that adequate answers to these questions will require us to obtain different types of data and to use different analytic techniques. In the remainder of this essay, I want to illustrate ways we might go about analyzing one sort of data. I want to suggest that, in addition to observing the act of writing (as J.R. Hayes and Linda Flower have done) we examine finished pieces of writing. Granted, analysis of written products cannot reveal everything that goes on during the composing process. But I do think that analysis of written products can help us identify a mind at work, a way of knowing.[9] One way to proceed is to assume that certain basic cognitive processes (e.g. awareness of contrast) may be reflected in any piece of writing and to determine whether different writers appear to have used that process in different ways. Consider these excerpts from two students' writing. Each student has been assigned the task of writing a story about a young boy who works hard, saves his money, and buys his first car. Here are the students' accounts of the boy's working.

Student 1

Right after school he started to look for a job. The first place Peter went to was a gas station. They told him he could start work tomorrow morning.

He worked there all summer and made $6,200 all together.

Student 2

Pete decided that it was time he looked for a second job. He had one part time job, but it wasn't bringing in enough money for his liking. Pete then found a second job working as an attendant in a gas station. It brought in more money, but it was hard on him. He would get up early and run down to the gas station where he worked until a quarter till twelve. Doing this didn't do much for his leisure and his social life so he became run down. But getting the car kept him going.

Neither of these students goes into great detail about this part of the narrative, but Student 2's work is interesting because the student mentions several contrasts between what was actually true and what the character wished was true: The character did not have the money he wanted; the new job was harder on him than he might have wished; his social life was not what it might have been. In brief, Student 2 seems to be thinking about two questions at this

point in her narrative: 1) what happened? (a question that Student 1 answers, although in somewhat less detail); 2) How is the character's situation different from what the character might wish? (a question that is not answered in Student 1's paper). I assume that one way of understanding any phenomenon is to consider how it contrasts with what might or should be. Thus I suggest that Student 2 is considering details in this phase of her narrative in ways that Student 1 is not. Her writing reflects one use of a cognitive process not found in the passage from the other student's writing.

If we assume that a written product can reflect cognitive processes (i.e. ways of examining data) and that certain basic processes (e.g., contrast) may be used in more than one way (cf Odell, 1977), we can go on to pose a question that parallels Hunt's question about development of syntactic maturity: If we were to examine a large number of writings done by students at several different age levels, would we find that students at one age level used basic cognitive processes in ways that older (or younger) children did not?

Another analytic procedure would entail identifying a theory of cognitive development and trying to define its principal terms in ways that are applicable to writing. For example, some of the key phrases from Piaget's discussion of egocentrism seem especially useful in discussing the following letter to the editor of a daily newspaper.

To the University of Michigan--so call Student body

> What, if I may ask as a tax payer and a person who pays taxes to support a bunch of Hoods, beer slops, punks, and you name it U. of M. has it including the commie Profs.
>
> I put (3) three sons through college and not one has a bunch of pigs like you birds...(rather, they are) men with good honest jobs, homes and families. If even one of my son's had come home and said he was going to burn his draft card, I could have took him apart piece by piece, then stick him back together and he would have been glad to enlist then, and I would not have cared if he ever came back.

Whatever else we may say about him, this writer is terribly egocentric. (C.F. Piaget's description of egocentric children, Six Psychological Studies, pp.

17-29). Other people exist chiefly to do as the writer instructs. Other points of view virtually do not exist; certainly, he does not take any serious account of values, experience, feelings other than his own. Furthermore, this writer assumes there is only one way to view the subject at hand and that there is no particular need to accommodate the needs/interests/values of his audience.

Since the letter to the "so call Student Body" was probably written by a chronologically "mature" person, it seems useful to examine comparable pieces of writing by other adults and ask two questions: To what extent and under what circumstances does egocentric thought appear? Are there comparable pieces of writing that reflect qualities which- perhaps because they seem antithetical to qualities apparent in the letter to the editor- indicate mature thought?

One final analytical procedure would entail asking writers to consider alternatives (e.g., in diction, syntax, organization) to choices they have made in their writing. We might pose these alternatives ourselves or we might ask a writer to re-write a given piece and then identify the alternative choices reflected in the revision. In either case, we would encourage a writer to explain the reasoning that leads him/her to prefer one alternative to another. We have some evidence (Cooper and Odell, 1976) that these explanations provide information that may not appear in writers' introspective comments on their own composing. Moreover, my own preliminary work in non-academic writing suggests that this procedure enables non-professional writers to talk freely and critically about their own composing. The question, of course, is whether these explanations might help us refine our understanding of mature writing. If we began with, say, Piaget's description of egocentric thought, would we be able to categorize writers' explanations as reflecting relatively egocentric or relatively mature thought? If we worked with writers of several different ages, would we find that the reasoning of the older writers differed from that of the younger writers and that these differences implied differences in the writers' cognitive maturity?

In proposing these possibilities for research, I am aware of several basic problems. The first is that the analysis of written products will not tell us all we need to know. It seems almost certain that in the course of doing a piece of writing, one may employ a given cognitive strategy to arrive at a given conclusion and then report only the conclusion without giving any indication of the process by which the writer reached that conclusion. Thus it may be that, in order to gain a relatively complete picture of a writer's cognitive activity, we shall have to examine both the writer's composing process and the completed written product.

Another problem is that we may have to formulate a rather complex definition of cognitive maturity. Conceivably, no one theory of cognitive development will provide a definition that applies to all the different types of writing we encounter. More over, it seems unlikely that any one feature of a written product will always indicate maturity or the lack of maturity. For example, in some contexts, a narration of the writer's experiences and feelings may be a relatively mature effort to accommodate the needs and interests of a reader. In other contexts, such a narrative may simply be a thoughtless, egocentric digression.

One final problem is that I am not at all sure we can assume that "mature" writing is synonymous with "effective" writing. Certain forms of apparently egocentric communication such as polemical reviews or angry letters may frequently have the desired effect. We may have to be very careful to identify the rhetorical contexts in which apparently "mature" writing is most effective.

But clearly I am hopeful of overcoming these problems. I think we can work toward a definition of cognitive maturity in writing and that such a definition can provide teachers and researchers with a sense of direction comparable to that afforded by the definition provided by Hunt's work on syntax.

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DOORS English - Assuming Too Much

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The semester was over. The papers were graded and stacked on my desk. The halls were quiet. As I sat there, leafing through the themes composed in my classes, I reflected on the semester's work — considering some of the success, but mostly the failure. I had tried my best; I had taught them everything I knew. Yet, I had a terrible feeling that many of my students wrote no better at the end than they did at the beginning. Why? Bill wasn't stupid, but he still couldn't organize his themes. Didn't he listen? Didn't he care? Jane was an extremely bright young woman, but her papers throughout the year were so superficial. Wasn't she mature enough to select meaningful topics? Over the years, I had experienced the same feeling, and I had tried various approaches — everything from free writing to literature study. Nothing really worked. Maybe I was simply assuming too much about my students.

Teachers of freshman English -- particularly in the community college -- assume a great deal about their students. For example, many college instructors believe that teaching the rhetorical types is important because students will face them in various forms and subjects. These types include cause/effect, comparison/contrast, process, narration, definition, summary, etc. If a history teacher, for instance, asks students to compare and contrast World War I to World War II on an essay or in a paper, the students are likely to do better if they have written similar assignments previously

in a composition course. Admittedly, these modes are important, but are students ready to deal with them at the level they are usually presented? Prior to writing a comparison/contrast paper, surely a college student must be able to grasp that form of organization when he reads it. Moreover, he must be able to manipulate information mentally, using comparison as a tool for arriving at logical decisions. But again, are college students successfully using these simpler forms of comparison. Apparently, most teachers believe so.

After more than ten years of teaching English and the rhetorical types at Illinois Central College, I began investigating seriously why many average college students were having so much difficulty writing themes in these modes, or why their themes were so superficial. Initially, I believed they simply could not organize, or their ideas were too synthetic, mundane, or immature. I viewed student failure, then, as a writing problem, not as a problem of faulty or lagging cognitive development. This period of investigation was followed by one devoted to reading the work of Piaget, particularly his theories about cognitive development. My purpose, obviously, was to determine if my students were suffering from some kind of developmental lag which affected their writing performance. As Piaget and others have pointed out, the child, when moving from infancy to maturity, seems to progress through four states -- from the sensori-motor and pre-operational to the concrete and the formal level of operations. Oversimplifying, one could probably say a person at the third stage -- the concrete -- learns a concept or acquires a skill best while actually manipulating concrete objects. For example, to teach the concept of comparison/contrast to the students at the concrete level, the teacher would be most effective by encouraging students

to compare two objects which could be handled or examined closely. An approach of this type is common during the first years of elementary school. However, once students have reached the formal level of operations, they can grasp this concept of comparison in an abstract manner. The instruction, for instance, might be strictly oral (a lecture) without any reference to concrete objects. This practice is common, beginning during the junior high school years or earlier. Despite Piaget's hypothesis that 17- or 18-year-olds should be at the formal level, I concluded my students might not have fully arrived at that point. If that were true, my instruction -- geared to the formal -- was falling on minds unable to understand what I was trying to do. Evidence for this tentative conclusion came from papers displaying a total lack of organization or papers of a superficial nature (comparing a Venus pencil to a Bic pen). Perhaps, even more convincing was that students could not really use the rhetorical skills as tools of logical thought once they had completed the course. They could not apply what they had learned, a fact noted by my colleagues in other disciplines. In short, a writing problem might be a manifestation of a much more basic problem in cognitive development.

For further clarification, I have created a chart below, attempting to illustrate the possible levels of difficulty involved in comparison/contrast tasks. As one can see, a given individual progresses through five stages of development from the concrete to the abstract, from the simple to the complex, and from the oral to the written. "Input" is defined as the method by which the two objects being compared are presented to the individual. "Output" is the manner by which the individual expresses his comparison, either orally or in writing. "Precision" is the expected quality of the comparison, moving from gross distinctions about concrete details to fine distinctions about abstract details.

COMPARISON CONTRAST HIERARCHY

Input		Output	Precision
Stage One		Oral	Gross distinctions about concrete detail.
Large, concrete object	Small, concrete object		
Stage Two		Oral	
Photograph of large object	Photograph of small object		
Stage Three		Oral	
Drawing of large object	Drawing of small object		
Stage Four		Oral or Written	
Written description of large object	Written description of small object		
Stage Five		Written	Fine distinctions about abstract detail.
Written description of an abstract concept, like the purpose or function of two similar things.			

At stage one, an individual could be asked to compare two similar objects like a Volkswagen and a Mercedes. The resulting description might be relatively gross if the person involved is a child, but finer distinctions would be expected from an adult. The gathering of details would be relatively easy because the examiner could directly observe the two cars both inside and out. The organization of the output is likely to be unsophisticated because the presentation is oral. At stage two, the examiner would have greater difficulty gathering data because the number of details would be reduced. Because it would be impossible to view the two concrete objects directly, the examiner would have to rely on what the camera detected. Again, the organization would be simple because of the oral output. Stage three is even more

difficult because now the examiner must rely on how the artist viewed the two cars. Thus, during the first three stages, the examiner's input is continually reduced because fewer and fewer concrete details are available for making the comparison. The output remains at the same level of difficulty because it is given orally. Stage four becomes more difficult because the input requires reading (more complex than vision) and writing (more complex than speech). Now the examiner must secure his information from reading and convey the differences in writing. At stage five the input and output remain as difficult as in the previous stage, but at this time the examiner must view the cars in a totally new light. Instead of dealing with concrete or perceptual qualities like size, shape, color and the like, the examiner may be called upon, for instance, to compare the motivation for buying each of the cars. Logically, it would appear that students must be able to handle comparison at the four lower levels before successfully meeting the demands of stage five.

The point I am trying to make is that Piaget and most English teachers probably assume college-age students, because of their age and previous experience, can easily deal with comparison in stage five. On the other hand, my experience lead me to hypothesize that some college students were not operating at the formal level of operations characteristic of stage five. My evidence came from student papers reflecting the qualities common to stages three and four. Thus, my feeling was that many of my students were at a transitional stage between the concrete and formal, and for that reason, my instruction, to be successful, had to start where the students were.

With this hypothesis in mind, I began searching the literature in three fields -- English, reading, and psychology -- to determine if any research had

been done on this idea. I was unable to find anything directly related to what concerned me. However, the available research and customary practice in teaching writing implied support for Piaget's notions. By accident, I discovered a growing body of research conducted over the last seven years by science educators, showing many young adults have not reached the formal level of operations. Instead, they were operating at the concrete or at a transitional point somewhere between the concrete and formal levels. Representative of these studies are Campbell (1977), Dunlap and Fazio (1976), Griffiths (1976), and McKinnon and Renner (1971). Although these studies were encouraging, they focused on various Piagetian experiments such as conservation of number or volume; that is, they measured whether students could grasp scientific phenomena. None directly investigated the rhetorical modes or types which seemed as fundamental as some of Piaget's tasks.

To test my notions, I developed a transfer-level English class for the DOORS program at Illinois Central College at East Peoria, Illinois. The acronym stands for Development of Operational Reasoning Skills, and the program includes a core of courses: introductory English, mathematics, history, economics, physics, and sociology. This interdisciplinary experiment, taught by six different instructors, is sponsored by the Fund for the Improvement of Post-Secondary Education (HEW). Although the teachers involved in the project are attempting to integrate the skills and content taught in the various courses, no teamteaching is done. As such, the program is not really intended for remedial students per se, but rather for average or slightly below average students who do not lack critical mathematics or reading skills.

At the outset of the semester, the six instructors agreed in principle with the notion that out students might be suffering from some type of lag

in cognitive development. For that reason, the DOORS teachers decided to center all of the six different courses on the skills undergirding the rhetorical types. In so doing, the instructors made the content subservient to an understanding of the rhetorical modes; we wanted our students to develop skills which they, in turn, would apply to the content. For instance, cause/effect was introduced and explained in the English class, but the physics teacher stressed the mode when students were dealing with problems in the laboratory. And in their respective disciplines, the other teachers focused on cause/effect in history, sociology, economics, and mathematics. Below is a chart showing the various reasoning skills stressed during the first seven weeks.

Week	English, History, Sociology	Math, Economics, Physics
1	Observation (Identification of variables)	Observation (Identification of variables)
2	Description (Describing variables)	Description (Describing variables)
3	Comparing or Relating (comparison and contrast)	Comparing or Relating (graphing)
4	Comparing or Relating (comparison and contrast)	Inferring (Graphing)
5	Classification	Separation and Control of variables
6	Classification	Separation and Control of variables
7	Summary	Separation and Control of variables

Specifically, in the English class, the students wrote seven papers in the following order: personal experience, process, comparison/contrast, definition, summary, cause/effect, and classification. This particular content is not unusual in the typical freshman English class; what is

unusual is how the modes were presented in DOORS. Contrary to other courses, I assumed my students could benefit from working on these rhetorical modes at the concrete level before dealing with the formal level. In a typical course, the teacher begins the instruction by explaining, for instance, how to write a classification paper. This approach assumes the student already knows what classification is and can actually classify. In DOORS English, I began the instruction by asking the students to perform a number of classification exercises to insure that they understood the concept behind the rhetorical type. Although it would be too difficult to explain all the exercises in detail here, I will try to discuss them generally. First, I provided the students with a set of 23 blocks which I had created and which they were to classify or group in as many ways as possible. Later exercises included a variety of progressively more complex material to classify: drawings, pictures, numbers, words, books, want ads, and letters to the editor. As far as possible, I tried to arrange the exercises in an ascending order of difficulty, moving from the perceptual and concrete to the abstract and formal. Although the nature of each of the rhetorical types was different, exercises of this type were created for all of them. After the students had the opportunity to deal with these concepts at a relatively concrete level, then I explained how to write papers, using the various modes. My assumption was that the act of using a rhetorical type in a theme represented its most complex or formal utilization.

The findings from the DOORS project have been reported elsewhere (Taylor, 1978), but a few conclusions are worthy of mention here. As I had hypothesized, most of my average college students were not operating at the formal level of operations. In the case of classification, for instance, the mean score for the grouping of blocks was a score of six out of a possible 13. When I questioned several students privately, I found they had rather confused

notions about this mode. Most realized that the material had to be placed in groups, but they did not understand that the groups must be related. In other words, they grouped data without regard for the relationship between the categories. Similar findings were evident with the other modes. Although the practice at the concrete level subjectively seems to have brought more mature papers, I have had difficulty creating a method to show statistically any transfer of this skill to the themes. More work needs to be done, but the results to date are encouraging.

In summary, DOORS English is an experiment with average or below average students. Although the content of the course is similar to others across the country, the method is unusual. The instruction begins at the concrete level, where most students are operating, and ends at the formal level when they use the rhetorical skill in writing. Lest I be misunderstood, I have not found that students are completely ignorant of the rhetorical modes or ways of thinking. However, I have found evidence that their knowledge is often faulty and confused, resulting in unorganized or superficial compositions. If students are to succeed, it appears teachers can profitably spend some time insuring that their students genuinely understand the concepts undergirding the rhetorical modes. We must not assume too much.

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What I Learned in the Second Grade

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Eight years ago, in an uncontrollable burst of idealism, I left the quietude of Carnegie-Mellon for a year to teach second grade in a Pittsburgh Public School. My purpose in doing this was to find out for myself if informal methods of teaching young children which had been demonstrated in English schools could be transplanted to American public schools. I had been particularly impressed by the writing that young children were apparently doing in the English schools and I wanted to organize my classroom in such a way as to encourage my children to write.

What I learned in the second grade was that informal teaching methods can be successful with ordinary American children and that ordinary American children can be remarkably good writers. (A sample of some of the hundreds of writings done by my second graders that year is attached). I will describe briefly how I organized my classroom and what I did specifically to encourage the children to write. Then I will pose a question that I believe deserves serious research.

My aim was to create a comfortable, non-threatening environment full of interesting and educational things for children to do from which they could choose the activity they wished to pursue at any given time. Some structure was provided for the children by four basic ground rules which I promulgated continuously: (1) do some reading today (2) do some writing today (3) do some arithmetic today (4) do not bother other people. Within this framework the children were free to talk and work together, move about the room, sit wherever they liked, use whatever materials and equipment they chose, and generally to govern their own behavior.

I organized the room into "interest areas" including a well-equipped art area which was instantly popular; a reading corner with comfortable chairs; a "science" area where we kept gerbils, guinea pigs, and fish and where we grew

plants; a math corner stocked with a variety of manipulative math materials; a 9 x 12 carpet on which children could build with blocks; and a writing corner stocked with an inexhaustible supply of pencils and paper, a large-type typewriter, and boxes of writing stimulus materials of various kinds. At any given moment there were usually children in all parts of the room.

I did almost no whole-group teaching of the conventional sort, i.e., I gave no spelling lessons or spelling tests, no social studies lessons or tests, no science lessons or tests, and no writing lessons. Nearly all of the "teaching" I did was with individuals or very small groups. By eliminating the whole-group lessons a large amount of time was freed up for the children's self-chosen learning activities and for my involvement with them on a one-to-one basis. I don't have space here to describe all of the kinds of things the children and I did in a typical day but I will try to describe very briefly how I encouraged them to write.

My meta-writing assignment (occasionally augmented by others) was "Write about anything you want to write about". About half the children were never at a loss for something to write about. Some had to learn first that anything they could say out loud they could write down. Not more than three or four of the children remained reluctant writers throughout the year and without exception these were kids whose hand-eye coordination was so poor that it took them forever to write a sentence. It was difficult for these children to derive any pleasure from writing because it was such hard work. Without the typewriter it would have been a long year for them.

Many of the children learned rather quickly that they could please me immensely simply by writing something and this was undoubtedly a powerful source of motivation for some of them. I am certain, however, that many of the children derived intense, intrinsic pleasure from the act of writing itself and from being able to read what they, themselves, had written. Writing was a no-lose proposition

for them; they loved to do it and they got lots of pleasant attention from me and from others for doing it.

My major emphasis was on production rather than neatness, spelling, punctuation and other niceties. I taught all of these things in the context of each child's writings but they were secondary to the importance of conveying a message or thought of some kind. As the children wrote they learned to spell the words they most needed and made steady improvement in sentence structure, punctuation and legibility.

In short I tried to make writing a source of pleasure and enjoyment for each child rather than the source of pain or embarrassment it so often is in school. Great blocks of time were available for writing so that no one felt compelled to rush to meet an arbitrary deadline. The flood of writing in a single day was often astounding. Writing became such an obsession for some children that I sometimes worried about it, especially when they wanted to stay in the room and write on warm, sunny spring afternoons.

Which brings me to the question I would like to pose for the researchers in our midst. If it is true, and I am convinced that it is, that normal seven-year-old children are not only able to write but enjoy writing, how is it possible that large numbers of 17-year-olds not only cannot write but avoid writing as though it were a social disease? What happens to them in school (or out) that cripples their ability and their desire to communicate in writing?

Probable causes are not difficult to think of. We might, for example, speculate about the long-term effects of the "Put your name in the upper right-hand corner, skip two lines, indent five spaces, don't forget to capitalize, watch your spelling, don't erase" school of writing instruction. Do some children get turned off because their teachers are too fussy or because they are required to do too much writing before they are ready?

Whatever else may contribute to writing failure I believe there is a large and significant component that could fairly be called "cognitive". From watching children write I believe there is a powerful connection between their thinking and their writing. When children's writing emanates from their own thought, their desire to express what they think and feel and remember, writing seems to be a pleasurable and exciting activity. When children's writing is limited to copying the thoughts of others (from the chalkboard, from workbooks, or from ditto sheets) it becomes a boring, tedious, unpleasant chore--something to avoid if possible or to finish quickly if it cannot be avoided.

There are, it seems to me, some researchable questions buried in the morass of teacher and student behavior involved in writing in school at all levels. Perhaps if someone among us could prove scientifically (perhaps with a massive grant from NIE or NSF) that writing can actually be an enjoyable activity for children we may eventually begin to apply this knowledge in more of our classrooms. I am so optimistic about this happening that I predict that Yasser Arafat will win the Nobel Peace Prize at about the same time.

Appendix: Samples of typical writings by second grade children at East Hills Elementary School, Pittsburgh, Pennsylvania, 1970-71.

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I am a girl and girls are not like boys. Sometimes some girls play with boys and boys play with girls. I do not play with boys because my mom said do not play with boys because they are too bad. I like to play with girls because they are nice. (Gloria S.)

One day me and my sister and cousins went to Westview Park and we paid for some tickets so we could ride and while we were riding the Whip all of the people were running to the Big Dip. Know what? A 14 year old girl fell off the Big Dip and she had broken ribs and her head was cracked and you could see her brain and her eyeball was hanging out of her head and her arm was ripped off and you could see her bones and she had broken bones too. A nurse was at the park and my mother and my cousin's mother was a nurse too until the ambulance came to take the girl to the hospital. After that we went home and they showed it on TV on Channel 11. Then we went to bed and when I go to school I'm going to write about it. (Richard)

My class has a new teacher. Her name is Miss Martino. She is nice to us. We are bing nice to her. Today is a special day because we are being good to the teachers. (JoAnn)

When you move you have to help with things and other people's stuff. I moved a lot of times. Now I moved to East Hills. I'll be sad when I move from there because of my friends. Todd and Andre will be sad too. I hope I don't move because I like them and they like me. (Roy)

The vampire bat of South America lives on blood. The wounds they make are small but if a person or an animal gets bit by one for all your life you might be ill from lost blood. As a matter of fact some bats have rabies so if you have a bat give it a rabies shot. (Brian)

My grandmother is in the hospital. And she got an operation on her but. And I'm sad. The end. (Wendy)

Today Dr. Sandberg is making soup and I brought two small potatoes. I think the soup is going to tast terrible because I don't like onion mixed with all those spices and vegetables and paint that Dr. Sandberg had on his hands. I do not have to taste it and I am not. (Brian)

Today I am looking at a picture about the beach. A little girl is sitting in the sand and looking at the water go past. And the sun is shining across the water. She is kicking the sand. And she is black just like me. (Connie)

Snowman are made out of snow. And win the sun comes the Snowman will melt. And on Christmas it will snow again. And you can make it over again. You can dress it up on Christmas. You can give your snowman a name like Keith. (LeSans)

There's people that like things and don't because they think of things with there own mind. Cuse would you like someone to tell you to do what he wants? No. That's why everyone isn't the same. (Brian)

I Know I Have A Dictionary in my Head
(but sometimes I can't read the small print)

some thoughts for the
Symposium on Cognition and Written Language

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The advent of Chomsky's theory of transformational-generative grammar in 1957 with the publication of Syntactic Structures quite naturally focused the attention of both linguists and cognitive psychologists on the syntactic properties of language. As the theory was developed and extended, more comprehensive examinations have been made of the systematic relations between meaning and sound in language, of how the system is acquired, and most recently, how we learn to use it in the context of pragmatic factors. The increased attention to the nature of meaning which followed the initial work of Katz and Fodor (1963) tended to focus on sentences or propositional semantics with a limited role for and interest in the lexicon.

A basic shift (as well as a schism) in the theory, however, was created by Chomsky's "Remarks on Nominalization" (1970) which formulated a much richer and significant conception of the lexicon while greatly simplifying the scope of the transformational component of the grammar. This position (known as the lexicalist hypothesis) laid the groundwork for the development of what Chomsky calls the extended standard theory (EST) in contrast to the transformationalist position which underlies the Generative Semantics (GS) position advocated by G. Lakoff, McCawley, Postal and others. My point in this paper is not to rehearse this dispute (for a reasonably unbiased discussion see J.D.Fodor, 1977), but to use the

work growing out of the lexicalist position as a way of asking some questions about the nature of the mental lexicon, about how it is acquired and develops, and how reading and writing play a role in developing each individual lexicon.

There is no comprehensive theory of the lexicon in linguistics, and as far as I am aware there is none in psychology either. It seems clear that this area is nearly a paradigm case, however, for collaboration between people trained in both fields since I suspect that a great deal of relevant material is known by both groups but in forms that may not be particularly easy to fit into an overall psycholinguistic theory. Part of what is probably needed, therefore, will be a process of sharing through which various approaches to studying these areas can be compared, contrasted, and where possible, integrated.

Before turning to some preliminary questions, let me briefly state why I think this is an issue of particular relevance to those of us concerned with helping develop the language using abilities of others as first and second language teachers, as speech and language therapists, and especially, as teachers of reading and writing. Perhaps the most important reason lies in whatever the commonplace connection is between cognition and language: words are related to concepts and so developing a lexicon is also developing ideas (and vice-versa). It's easy enough to say that this is true, much more difficult

to show what it involves or how it works.

Vocabulary knowledge traditionally has been used as a measure of intelligence and as a predictor of school success and indeed it seems to do so quite well. It seems further that people who are intuitively recognized as excellent language users have, among other traits, rich and flexible vocabularies, as well as control over the word formation process that permit them to create nouns from verbs, adverbs from adjectives, compounds of all sorts, and so on. Equally crucial and possibly related may be the capacity to create and comprehend metaphoric usages of words which extend their meanings. In fact it seems clear that while a case can be made for something like a shared competence system which defines each human language system and which each speaker "knows" (albeit tacitly), this shared system involves the only core of the syntactic, semantic, and phonological properties. There are clearly a great many other properties of the system which are properties of the lexicon and of an individual lexical item and which are only shared by those with full knowledge of the lexical items and a variety of flexible ways of using them. There are no empirical studies that I know of which directly test this distinction, but it seems to me to be one of the plausible ways of accounting for the apparent competence differences reported in Gleitman and Gleitman (1970) and Brause (1975).

If this is true for the linguistic theory (and there is a growing body of linguistic support for it, see for example Bresnan, 1978), the many aspects of acquiring a richer and more

flexible language system must be based upon vocabulary development. This is both good news and bad news. It is good news in the sense that it seems true that vocabulary development is at least potentially a lifelong process and is therefore very amenable to impact by teachers and schools. Further, intuitive and actual evidence shows that reading and writing can contribute to vocabulary growth. The bad news, however, is that we still know too little about how to develop an individual's vocabulary except to be quite confident that direct instruction on vocabulary items does not work. It does seem clear that there is a high correlation between vocabulary knowledge and reading ability, and that reading and writing both build vocabulary.

Focus on the lexicon should not, of course, blind us to the relations between lexical and other kinds of linguistic processes and indeed the extentions of the lexicalist hypothesis suggest that there are more direct connections that used to be believed. Learning words clearly involves, minimally, learning their grammar (a notion that goes far beyond their "part of speech"), their meanings in particular syntactic contexts, their conditions on use (as well as co-occurrence restrictions with other words), and their pronunciation. It also seems probable that not all of this happens all at once and we apparently are also constantly shifting slightly the meanings of words we "already know" or adding new senses to them. Lexical knowledge also clearly includes word formation rules of various sorts, some of which probably can be learned explicitly.

It is not clear how all of this shifting sand can be steadied sufficiently for study. But it is certain that each

of us has some sort of mental lexicon, that I am using mine as I write and you yours as you read, and that mine shares enough properties with yours to enable us to communicate pretty well although imperfectly. Further understanding of how all this works seems crucial for all of us in applied psycholinguistics and the following questions are offered as a beginning of the process of bringing more light to the understanding of our mental dictionary.

What does it mean to <u>know</u> a word?

What do we <u>know</u>?

What can we <u>do</u>?

How did we learn it? (Do we learn differently at different ages?)

How is our knowledge of words interconnected?
(How do we learn how to form new words?)

How is our knowledge of words related to our knowledge of the world?

What role does reading play in expanding our vocabulary?

What role does writing play in expanding our vocabulary?

How do reading and writing differ in this regard from speaking and listening?

What can schools and teachers do to foster vocabulary growth?

How can we best evaluate vocabulary size (and growth)?

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